

Chapter 2: Alternatives

For an environmental assessment (EA), Federal Highway Administration (FHWA) Technical Advisory T6640.8A requires the discussion of at least two alternatives: a no-build alternative and one or more build alternatives. This chapter presents the two alternatives currently under consideration for SR-12 between Escalante and Boulder:

- No-Build Alternative
- Build Alternative (i.e., Proposed Action)

The project team identified the proposed action based on roadway deficiencies, extensive public involvement, and agency coordination. From the over 450 suggested improvements that came from the public and various agencies, the project team developed a list of potential spot improvements. In coordination with FHWA and the Bureau of Land Management (BLM), the Utah Department of Transportation (UDOT) decided to only include projects that, based on future funding availability, could reasonably be constructed in the next ten years.

The purpose of the SR-12 project, as described in Section 1.2, is to do the following:

- Provide adequate space for UDOT to perform ongoing maintenance operations on the roadway and supporting infrastructure
- Improve safety and infrastructure where the roadway facilities are deficient or deteriorating
- Accommodate the wide range of corridor users

Spot improvements were prioritized according to safety, context, and constructability. The most time-critical spot improvements were given the highest priority and are included in the Build Alternative. Areas with a high number of accidents or areas where infrastructure is failing are considered time-critical. Less time-critical spot improvements were not included in the Build Alternative, as discussed in Section 2.4.

2.1 INDEPENDENT UTILITY AND LOGICAL TERMINI

Federal law, 23 Code of Federal Regulations (CFR) 771.111(f), requires that any transportation project evaluated under the National Environmental Policy Act (NEPA) must have independent utility and logical termini. Specifically, the law states that the project must do the following:

Connect logical termini and be of sufficient length to address environmental matters on a broad scope ... have independent utility or independent significance, i.e., be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made ... [and] not restrict consideration of alternatives for other reasonably foreseeable transportation improvements (23 CFR 771.111[f]).

The logical termini for this project are at mile post (MP) 59.8—the intersection with Hell’s Backbone Road at the east end of Escalante—and MP 86.3—the intersection with the Burr Trail at

the south end of Boulder. SR-12 is the only paved connection between these two communities, and there are no towns or intersections with major roads between them. Although right-of-way is only an issue for a 14.2-mile section of the corridor, the project purpose to address deteriorating roadway facilities, improve safety, and accommodate a wide variety of corridor users necessitated looking at the entire corridor between Escalante and Boulder. For this reason, the project termini are at these two towns. The project will provide sufficient benefit even if no other projects are constructed, and it will not restrict the potential for future transportation improvements.

2.2 ALTERNATIVE DESIGN AND EVALUATION CRITERIA

Design Criteria

A context sensitive approach was used in the selection of design criteria. Design criteria are standards used in engineering design and include elements like design speed, lane and shoulder widths, minimum horizontal and vertical curve radii, side slopes, and sight distance. A variety of different approaches were taken into consideration during the development of design standards, including guidance from UDOT, the American Association of State Highway and Transportation Officials (AASHTO), the U.S. Forest Service (USFS), and the National Park Service.

The primary guidance document in developing design standards for this project was the *UDOT Resurfacing, Restoration and Rehabilitation (3R) Standards for Non-Freeway Systems*. The basic purpose of the 3R design standards is to provide a better riding surface, enhance safety, improve operating conditions, and preserve and extend the service life of existing non-freeway systems. These standards were selected taking into consideration the character and context of the area.

Context Sensitive Goals and Objectives

Improvements were suggested by the public, Context Sensitive Committee (CSC), and agencies. Each improvement was screened by the project team against evaluation criteria developed by the CSC—as discussed in Section 6.4.5—to determine which improvements should be included in the Build Alternative. The following are evaluation criteria developed for the SR-12, Escalante to Boulder, project:

- Preserve the history of the corridor
- Contribute to the economics and culture of the community
- Meet the needs of the natural environment and preserve water resources
- Limit changes to the roadway and do only what is absolutely necessary to meet safety and traffic demand needs
- Maintain the character and visual appeal of the road, and, if possible, enhance the driving experience
- Incorporate science, research, and facts into an open decision-making process
- Improve ability to perform adequate maintenance operations appropriate to place

The input received indicated strong support to maintain the existing character of the road by only making improvements that were absolutely necessary.

2.3 ALTERNATIVE DEVELOPMENT PROCESS

The improvements to be included in the Build Alternative were determined by several steps:

- Identifying needs. Input was gathered from the public, CSC, and agencies to help identify needs—see Chapter 6 for a detailed discussion. The project team found that input on the corridor’s needs frequently came in the form of suggested improvements. The project team also reviewed previous studies, met with maintenance personnel, and conducted field reviews to identify needs. This initial process resulted in over 450 suggested improvements.
- Consolidating needs and suggested improvements. The project team consolidated the list of over 450 suggested improvements by combining or grouping similar suggestions.
- Eliminating suggested improvements that do not meet the project’s purpose and need or have excessive environmental impact or cost. Suggested improvements that were eliminated and reasons for elimination include the following:
 - Restricting bicycle use. It does not meet the project’s purpose and need. Furthermore, SR-12 is the only paved route between Escalante and Boulder. Bicycles are not currently restricted on any road in Utah without an alternate route.
 - Building a bypass road around Calf Creek Canyon. It would cause excessive environmental impacts and costs.
 - Paving Hell’s Backbone Road from Escalante to Boulder. It would cause excessive environmental impacts and costs.
 - Building a separate bike path. Three different and separate bike path alignments were considered:
 - Within the right-of-way but separated from the roadway
 - Along the power corridor
 - Along the old Cream Cellar Road alignmentHowever, a separate bike path was eliminated from the Build Alternative because of excessive environmental impacts and costs as well as impacts to wilderness study areas (WSAs).
- Screening against design and context sensitive goals and objectives. The project team evaluated the suggested improvements and associated needs using UDOT’s 3R design standards, taking into consideration the sensitive context of the area. Suggested improvements were eliminated if existing conditions met design standards or if suggestions were not consistent with the context. Typically, this screening eliminated realignment of sharp horizontal curves. There are no horizontal curves on the corridor that currently do not meet 3R design standards.
- Prioritizing suggested improvements. Utilizing public, CSC, and agency input as well as engineering judgment, the remaining improvements were prioritized based on safety, context, and constructability. These improvements are summarized in Table 2.1. Accident data was closely studied, and clusters were identified. Improvements were prioritized into the following categories:
 - High-priority improvements. These spot improvements are in areas with a higher number of accidents or with rapidly deteriorating infrastructure. They could reasonably be expected to get funding in the next ten years.
 - Lower-level priority improvements. These improvements are in areas with an average number of accidents or with infrastructure in average condition. Needs

associated with these improvements could be addressed in the short term with less impactful approaches, such as enhanced signing and striping. These improvements may be needed if traffic levels exceed those predicted for 2030.

Table 2. 1: Prioritized List of Suggested Improvements

Priority	Suggested Improvement
High	Obtain right-of-way
	Replace Calf Creek Bridge and realign Calf Creek
	Stabilize roadside where supported by W-beam guardrail (MP 74.8) and barriers where sloughing off shoulder (MP 75.4 and MP 77.5 – MP 77.7)
	Provide slow-vehicle turnouts (eastbound: MP 71.7, 76.2, 79.5; and westbound: MP 69.9, 72.5, 83.0)
	Improve intersections: Hole-in-the-Rock Road and Calf Creek Recreation Area
	Widen curve at “The Tank” (MP 71.0)
	Improve signing corridor-wide with signage like shared roadway with bicycles, animal warning, limited sight distance, speed transition, speed advisory, and delineator posts
Lower	Widen shoulders to four feet for entire corridor
	Reclaim area incorrectly perceived as a parking area (MP 75.4)
	Address horizontal sight distance at 15 curves
	Improve the following intersections: Boynton Overlook Wayside, Kiva Koffee House, and Landfill Road
	Improve clear zone at steep ravine crossings along Big Flat (MP 60 – MP 68.9)
	Improve striping, which would include evaluating the cross walk at MP 60.4 and the centerline striping on New Home Bench
	Evaluate passing lanes
	Improve the following intersections: Airport Road, Sawmill Road, and Escalante River Trailhead
	Improve clear zone on sharp curves at MP 70.2 and MP 73.5
	Flatten three vertical curves in Camelbacks (MP 71.5 – MP 73)
	Construct cattle fencing in Camelbacks (MP 71.5 – MP 73)
	Widen shoulders to four feet (MP 68.9 – MP 86.3)

2.4 IMPROVEMENTS NOT CARRIED FORWARD FOR DETAILED EVALUATION

Lower-priority spot improvements were eliminated from the Build Alternative. These are not reasonably expected to get funding in the next ten years and will not be evaluated in detail in this EA. The following are spot improvements eliminated from the Build Alternative:

- Widening shoulders for entire corridor. (Shoulders will be widened at spot-improvement locations only.) Widening shoulders for the entire corridor would result in considerable environmental impacts and costs. SR-12 was originally constructed by the Civilian Conservation Corps (CCC) using explosives to blast through sandstone. As shown in Graphic 2.1, shoulder widening would require extensive blasting or retaining walls, especially in the following locations:
 - Descent from Boynton Overlook Wayside to the Escalante River (MP 73 to MP 74)
 - Calf Creek Canyon (MP 74 to 76)
 - The Hogsback, including the approach (MP 78 to 79.5)
 - Descent from New Home Bench to Boulder (MP 73.5 to 85)

According to AASHTO’s *Guide for the Development of Bicycle Facilities*, widening shoulders to four feet would significantly improve safety and convenience for bicycles. Four-foot shoulders would allow a vehicle to pass a bicycle without crossing the centerline.

However, the accident rate does not suggest an immediate need to widen shoulders; there are no recorded accidents involving bicycles. Beyond 2030, increased traffic and bicycle use could make this improvement a higher priority. At locations where spot improvements are proposed as part of the Build Alternative, a four-foot shoulder will be accommodated. Narrow shoulders could be addressed with less impactful methods, such as improved signing. (See Section 2.5.7 for more detail.)

Graphic 2. 1: Difficult Areas for Shoulder Widening

Descent from Head of the Rocks



Descent from Boynton Overlook Wayside to Escalante River



Calf Creek Canyon



The Hogsback



Descent from New Home Bench to Boulder



- Reclaiming area incorrectly perceived as a parking area (MP 75.4). Accident data does not show a higher than average rate of accidents in this location.
- Improving intersections at eight other locations along the corridor, including Airport Road, Sawmill Road, Boynton Overlook Wayside, Kiva Koffee House, Escalante River Trailhead, Hell's Backbone Road, and Landfill Road. Accident data does not show a high rate of accidents related to turning movements at these locations.
- Improving clear zone at steep ravine crossings along the Big Flat located at MP 60 to MP 68.9 and on sharp curves at MP 70.2 and MP 73.5. Accident data does not show a higher than average rate of accidents in these locations.
- Improving pavement and drainage in the Camelbacks located at MP 71.5 to MP 73. Improving the pavement and drainage at this location would require full-depth reconstruction (i.e., a new subgrade). However, there is not a problem with standing water or hydroplaning accidents at this location so limited funding is better spent improving other locations.
- Improving striping (e.g., cross walk and centerline striping). At MP 60.4 where Escalante High School is located, a cross walk from the school to the gas station across the street was considered. Accident data does not show a high rate of accidents at this location. However, UDOT could pursue a cross walk through its Traffic and Safety Department at any time regardless of the decision on this EA. Improving centerline striping along New Home Bench was also considered. However, the proposed slow-vehicle turnouts in the Build Alternative would provide safer opportunities to pass.
- Providing passing lanes. This suggested improvement does not meet the evaluation criteria to incorporate safety improvements that are consistent with the context of the roadway. Because of low traffic volumes, shorter slow-vehicle turnouts could satisfy the need and are more consistent with the context of the area.
- Flattening vertical curves in the Camelbacks located at MP 71.5 to MP 73. Accident data at this location is not higher than the average rate. This suggested improvement does not meet the evaluation criteria to incorporate safety improvements that are consistent with the context of the roadway.
- Installing wildlife or cattle fencing. SR-12 contains winter range for deer. Constructing wildlife fencing would be problematic because it would dissect this habitat, and input from the public and CSC indicated little support for wildlife fencing. Cattle fencing was previously installed in Big Flat in 2004. There is now either fencing or a natural barrier for cattle from MP 62 to MP 71. Cattle grazing within the Grand Staircase-Escalante National Monument is currently being analyzed in BLM's *Rangeland Health Environmental Impact Statement*. Wildlife and domestic animals could be addressed in the short term with less impactful methods, such as improved signing.
- Improving sight distance at select horizontal curves through rock removal or curve realignment. Improving sight distance could be addressed through a variety of methods. These improvements range from installing signs that warn motorists of limited sight distance or post advisory speeds to cutting back rock or realigning curves. Input received indicated a strong desire from many people not to realign curves. Support for rock removal was mixed. Generally there was support for addressing sight distance with less impactful methods, such as improved signing.
- Providing pavement treatment (e.g., rumble strips). This suggested improvement does not meet the evaluation criteria to incorporate safety improvements that are consistent with the context of the roadway. Noise created by vehicles passing over rumble strips

could potentially conflict with the area's recreational and wilderness characteristics. Additionally, rumble strips create more long-term maintenance requirements.

2.5 BUILD ALTERNATIVE

The Build Alternative to be evaluated in detail includes the following highest priority spot improvements from the potential list of improvements. Because NEPA does not require that more than one alternative besides the No-Build Alternative be analyzed in an EA, all time and safety critical improvements were combined into one alternative. These improvements are numbered below, and the numbers correspond to their location on Figure 2.1.

- 1) Obtain right-of-way from MP 68.9 to MP 83.1, where it is currently defined by Revised Statute 2477, also known as RS-2477.
- 2) Replace Calf Creek Bridge at MP 74.5.
- 3) Stabilize roadway at three locations where embankment or barrier is failing:
 - MP 74.8 (3a).
 - MP 75.4 (3b).
 - MP 77.5 to 77.7 (3c).
- 4) Provide six slow-vehicle turnouts, which are intended to allow slow-moving vehicles to pull aside and let other vehicles pass (they are not intended for parking):
 - Eastbound at MP 71.7, 76.2, and 79.5 (4b, 4d, and 4e).
 - Westbound at MP 69.9, 72.5, and 83.0 (4a, 4c, and 4f).
- 5) Improve two intersections:
 - Hole-in-the-Rock Road at MP 64.4 (5a).
 - Calf Creek Recreation Area at MP 75.0 (5b).
- 6) Widen roadway at narrow curve known as "The Tank," located at MP 71.0.
- 7) Improve signing for bicycles, animal presence, and roadside hazards along the entire corridor. (Specific locations will be determined during design so these are not depicted on the map.)

Each improvement is discussed in more detail in the following sections (2.5.1 through 2.5.7).

2.5.1 Obtain Right-of-Way

Currently, UDOT cannot properly maintain the corridor because the right-of-way is ill-defined and has never been physically delineated on the ground. Similarly, WSAs in the area are ill-defined and have never been physically delineated on the ground. To properly maintain the road, UDOT is requesting a clearly defined right-of-way corridor from BLM.

Existing RS-2477 Right-of-Way

RS-2477 was adopted in 1866. At the time, this statute granted right-of-way for highways across public lands. It reads in its entirety, "The right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." RS-2477 was repealed by Congress in 1976 when it passed the Federal Land Policy and Management Act. This has been a source of recent controversy. Roads that existed on public lands prior to 1976 still have a valid state or county right-of-way; however, the width is undefined.

For 14.2 miles through the Grand Staircase-Escalante National Monument, from Head of the Rocks to the USFS boundary (MP 68.9 to MP 83.1), UDOT's SR-12 right-of-way is defined only by

RS-2477. Correspondence dated December 15, 1992 from BLM to UDOT acknowledges the RS-2477 claim; this correspondence can be found in Appendix A. The width of the RS-2477 right-of-way is defined in this correspondence and reads as follows:

This RS-2477 right-of-way will be from edge of disturbance to edge of disturbance. The width of the right-of-way will vary based upon the width of the presently disturbed area needed for maintenance and the use of the highway and for due and necessary improvements to the highway using the most current design and construction techniques available (Martinez 1992).

The “edge of disturbance to edge of disturbance” right-of-way has never been physically delineated; therefore, identifying the edge of the right-of-way is subjective. This subjectivity has made it difficult for UDOT to perform some maintenance activities because it is not clear where they have rights to access property; the “edge of disturbance,” changes with time.

Title 23 Right-of-Way Request

To provide sufficient right-of-way for UDOT to perform adequate maintenance operations, FHWA is requesting a Title 23 federal land transfer from BLM. Title 23 is the standard transfer mechanism for highway right-of-way. FHWA would then grant a highway easement deed to UDOT; the underlying land would remain federal land. For a Title 23 land transfer under NEPA, FHWA is the lead agency.

The Grand Staircase-Escalante National Monument was established on September 18, 1996. The proclamation withdrew all federal lands and interests from entry, location, selection, sale, leasing and other disposition under the public land laws. It has since been determined that the Federal Highway Act is not a public land law and therefore is operative on monument lands. In other words, it has been determined that a Title 23 is a viable land transfer mechanism in the monument.

UDOT is requesting a total of 351.5 acres from MP 68.9 to MP 83.1. The requested right-of-way is shown as Improvement 1 on Figure 2.1 and is shown in detail on Figure 2.2. In general, the right-of-way request for the 14.2-mile section is for a 100-foot half width. Half width is defined as the distance from roadway center line to outer edge of right-of-way. A 100-foot half width results in a total right-of-way width of 200 feet. UDOT acknowledges the sensitive area and context of this corridor and is requesting the minimum width necessary to maintain the road. Typically, UDOT requests a 400-foot wide right-of-way corridor through BLM land.

As shown on Figure 2.2 and in Table 2.2, there are some areas along the 14.2-mile section of SR-12 where UDOT is requesting more right-of-way than a 100-foot half width. UDOT is requesting the additional right-of-way necessary to do the following:

- Maintain the roadway embankment in areas where the existing toe of slope extends beyond the 100-foot half width.
- Include an old section of SR-12 that has not been used for traffic since a sharp curve between MP 75.6 and MP 75.8 was realigned in the 1980s. This area would allow UDOT to access and maintain existing drainage features.
- Include the existing Boynton Overlook Wayside.
- Accommodate one stockpile site.

Stockpile sites are areas where UDOT crews could store materials necessary for roadway maintenance and construction projects (e.g., embankment). Stockpile sites reduce maintenance and construction costs because they eliminate the need to haul material to and from the area. Additionally, stockpile sites allow UDOT crews to use native material for maintenance activities. Rock and soil must be removed from roadside ditches in the spring, and this material could be stockpiled for later use. By using native material, construction and maintenance projects are visually blended into the environment and are therefore more aesthetically pleasing. The requested stockpile sites are all previously disturbed areas that have been used for that purpose in the past.

Table 2. 2: Right-of-Way Requests in Addition to 100-Foot Half Width

Location	MP	Description	Acres
SR-12 Corridor (see Figure 2.2 for detail)	68.9 – 83.1	Generally 100' half width (200' total) of right-of-way width, except where noted below.	346
	70.2 – 70.4	Requesting wider half width because existing toe of slope extends outside 100' half width	
	71.0 – 71.1	Potential for future flattening sharp curve radius	
	73.1 (Boynton Overlook Wayside)	Existing overlook extends outside 100' half width	
	73.7 – 73.8	Existing toe of slope extends outside 100' half width	
	75.3 – 75.6	Existing toe of slope extends outside 100' half width	
	75.6 – 75.8 (Old Section of Road)	Maintenance access for existing drainage features	
	75.8	Existing toe of slope extends outside 100' half width	
	77.0	Existing toe of slope extends outside 100' half width	
	77.3 – 77.6	Existing toe of slope extends outside 100' half width	
	78.7 – 78.8	Existing toe of slope extends outside 100' half width	
Previously disturbed stockpile area on New Home Bench on east side of road (Improvement 1a on Figures 2.1 and 2.2)	82.1	Stockpile site	5.5
Total			351.5

The total right-of-way request is for 351.5 acres. This area includes the existing RS-2477 right-of-way. Because the RS-2477 right-of-way has never been formally delineated, it is not possible to quantify how many acres are being requested in addition to the rights UDOT already possesses through the existing RS-2477 right-of-way.

There are 80 acres of privately owned land with several different owners south of the Escalante River Bridge where UDOT has a prescriptive easement. A prescriptive easement does not have a set width. Utah State law, under Utah Administrative Code (UAC) 72-5-104, establishes an

easement for the public after ten continuous years of usage as a roadway. As part of this EA, UDOT is not actively seeking right-of-way for lands adjacent to SR-12 that are under private ownership. There are no proposed improvements through this area.

Wilderness Study Areas

The Wilderness Act of 1964 provides a legal framework for Congress to protect exceptional and undisturbed natural areas. A wilderness area is set aside for non-motorized recreation, scientific research, and other non-invasive activities. Surface disturbing activities—such as logging, mining, roads, and mechanized vehicles—are restricted. A WSA is a roadless area that has been inventoried and found to have wilderness characteristics but has not been designated by Congress. BLM manages WSAs to protect their value until Congress decides whether or not to select them for wilderness designation. BLM has a legal mandate to manage WSA lands for non-impairment under the *Interim Management Policy for Lands Under Wilderness Review* (IMP). Under the IMP, WSA management can be more restrictive than management in designated wilderness. Each designated wilderness, through authorizing legislation and the development of a specific management plan, may provide for the continuation of certain uses that could not be authorized in a WSA under the IMP. The IMP is available at http://www.blm.gov/pgdata/etc/medialib/blm/ut/natural_resources/utah_wilderness.Par.28799.File.dat/WildernessIMP.pdf. Surface disturbing activities are not allowed within these areas.

As shown in Figures 2.1 and 2.2, SR-12 between Escalante and Boulder is constrained by two WSAs: the Phipps-Death Hollow WSA Complex on the west side and the North Escalante Canyons/Gulch WSA Complex on the east side. Similar to the RS-2477 right-of-way boundary, these areas are defined by “edge of disturbance” and have never been precisely delineated. If UDOT had been granted right-of-way prior to wilderness inventory, the WSA boundary would have been designated at the right-of-way line. Unfortunately, multiple efforts by UDOT to obtain right-of-way from BLM were unsuccessful. The boundaries shown in Figures 2.1 and 2.2 are approximate.

BLM has recommended that UDOT apply for an appropriate right-of-way width throughout the corridor. The 100-foot half width that UDOT is requesting may overlap with WSA lands in some locations. The exact locations have not been precisely delineated on the ground and surveyed. Stipulations of the right-of-way transfer would ensure the continued protection of any overlapping WSA lands for non-impairment. BLM would transfer the requested right-of-way to FHWA. FHWA would then be required to manage any overlapping WSA lands within the transferred right-of-way according to the IMP “so as not to impair the suitability of such areas for preservation as wilderness.” Because the underlying land would remain federal land, FHWA would be required to insure non-impairment through stipulations of the grant for a highway easement deed to UDOT. FHWA and UDOT would provide a role for BLM involvement in delineation of WSA boundaries. For example, if construction were planned for an area adjacent to a WSA, local BLM and UDOT personnel would meet in the field to agree on the placement of construction fencing at the “edge of disturbance.”

Administrative actions may be approved by BLM in areas restricted by WSAs if the health and safety of the public is a concern. However, these administrative actions can be authorized by BLM in specific areas only and cannot be applied throughout the length of the corridor in its entirety. (See Appendix A for correspondence regarding WSA boundaries.) After the right-of-way is transferred, FHWA would be the federal agency authorized to approve specific actions in

areas restricted by WSAs. These actions include “emergency maintenance or emergency repairs to protect human health and safety...” or the construction of “permanent facilities that are the minimum necessary for public health and safety in the use, enjoyment, and protection of wilderness values.”

Although the requested right-of-way may extend beyond the WSA boundaries, none of the proposed spot improvements, as discussed in Sections 2.5.2 through 2.5.6, would require surface disturbance within a WSA. There is one proposed improvement at MP 72.5 that is inside a WSA according to official BLM maps. However, BLM acknowledges a mapping error in this location. From MP 71.9 to MP 73.1, there is a power line on the west side of SR-12. BLM believes this power line was the intended WSA boundary, rather than the west edge of SR-12 as shown on their WSA maps. Therefore, BLM supports the position that the proposed slow-vehicle turnout at MP 72.5 does not encroach on a WSA. See email correspondence from Paul Chapman dated January 8, 2008 in Appendix A.

Until Congress designates the WSAs as wilderness or releases them from further wilderness study, construction and maintenance by UDOT will remain difficult, inefficient, and limited. UDOT generally has a right-of-way that extends at least 30 feet beyond the toe of slope on other roads. This additional width allows UDOT crews to maintain the embankment from the toe of slope with equipment. This additional width will not be available in WSAs until Congress resolves the wilderness issue.

2.5.2 Replace Calf Creek Bridge

The replacement of the Calf Creek Bridge and the realignment of Calf Creek in the vicinity of the bridge are consistent with the project’s purpose to improve safety and infrastructure where the roadway facilities are deficient or deteriorating. Bridge replacement is shown on Figure 2.1 as Improvement 2 and is shown in detail on Figure 2.3. The existing bridge at MP 74.5 is a structurally deteriorated, steel-plate pipe constructed in 1964. The bridge is in poor condition and has a sufficiency rating of 58 out of 100, which requires corrective repairs according to UDOT’s bridge preservation program. There is inadequate cover over the bridge; the distance between the top of the steel-plate pipe and the top of the pavement is less than one foot. The bridge width is 24 feet curb-to-curb, which does not allow for 12-foot lanes and shoulders in both directions. The parapet—a low wall or railing to protect the edge of the bridge—is constructed of wood and mounted on a concrete curb; it does not meet crash test requirements.

Another problem with the bridge is scour. Scour is erosion of the channel, bank, or abutments supporting the bridge. As shown on Figure 2.3, Calf Creek runs south—parallel and adjacent to SR-12 immediately upstream from the bridge—and then turns sharply to run east under SR-12. This sharp turn produces large scouring forces on the southwest abutment. Severe erosion is clearly evident at the wing wall; large boulders have been placed where the wing wall and bank meet as an emergency maintenance measure to prevent further scour. Hydraulic capacity is not an issue, and there is no evidence of overtopping the road.

Replacing the bridge would correct structural and geometric deficiencies, allowing for adequate lane and shoulder width. Additionally, bridge replacement would include a new parapet to meet crash test requirements. The parapet would be designed to be aesthetic and to blend in with the

natural environment. Barrier height could range from 18 inches to 36 inches and will be determined during the design phase.

Realigning Calf Creek at the crossing would address scour issues at the southwest abutment. By turning the creek east upstream from the crossing at a more gradual angle and increasing the skew on the bridge, the scouring forces would be reduced. This will require relocating the Calf Creek Bridge to the north of the existing location. The new bridge could be constructed prior to removal of the existing bridge.

As shown in Figure 2.3, the proposed cross section would allow for a two-lane road with a 35 mph design speed, including a 12-foot travel lane in each direction, four-foot shoulders, and two-foot barrier offset from the face of the parapet. The existing steel-plate pipe would be replaced with a new structure. The roadway alignment and profile would be similar to existing conditions. The box culvert would be skewed approximately 40 degrees from the roadway and would be approximately 55-feet long measured lengthwise along the center of the box culvert. The bottom of the box culvert would be embedded below the stream channel elevation. This would allow natural substrates to fill in the bottom of the box, mimicking a natural channel. Approximately 300 linear feet of Calf Creek would be realigned.

As shown on Figure 2.3, an alternative bridge location was initially considered. This option would have relocated Calf Creek to an old channel section. It was eliminated for the following reasons:

- Greater wetlands impact (0.16 acres instead of 0.10 acres)
- Greater stream channel impact (600 linear feet instead of 300 linear feet)
- Longer box culvert (150 feet instead of 55 feet)

A longer culvert is undesirable. Vegetation, which provides benefits for water quality and aquatic life, cannot establish in culverts. Velocity increases when a stream is channelized, and this increases erosion. A longer culvert would also increase project costs.

Funding for bridge replacement has not yet been secured. UDOT may use a phased solution and, during the interim, provide scour abatement at the southwest abutment until funding is available. Revetment—a facing of masonry or stones—could be used to protect the embankment from further erosion.

2.5.3 Stabilize Roadway and Roadside

This improvement would address the project's purpose to improve safety at locations where the roadway is deteriorating. There is one area where roadway embankment is not stable and threatens the road and two additional areas where existing Jersey barriers do not have enough pavement under or behind them to withstand a collision. This improvement is included in the Build Alternative at three different spot locations, MP 74.8 (Improvement 3a on Figure 2.1), MP 75.4 (Improvement 3b), and from MP 77.5 to MP 77.7 (Improvement 3c), as discussed in the following sections.

One of the most common comments received during early public involvement for this project was related to the visual impact of concrete barriers. There was an overwhelming desire expressed to use aesthetic barriers instead of concrete Jersey barriers on the corridor where

possible. Of 152 comments received regarding barriers, 82 percent of those who were in favor of barriers in select locations wanted aesthetic barriers. In spot-improvement areas, these aesthetic barriers could be put up where the concrete Jersey barriers are now. In areas where the design speed is 35 mph or slower (specifically, spot improvements 3a, 3b, and 3c), it may be possible to use an 18-inch high aesthetic barrier and still meet crash test requirements. A low barrier would not block the views from the road and would be less visible from areas located below the road. These shorter aesthetic barriers are typical of places like Glacier National Park, as seen in Graphic 2.2, which shows an 18-inch barrier. The height of the aesthetic barrier would range between 18 and 36 inches and will be determined during the design phase. Additionally, the barrier would be incorporated with colors and textures that blend into the environment.

Graphic 2. 2: Glacier National Park Aesthetic Barrier Example



Stabilize Roadway at MP 74.8

There is a short stretch of 100 feet that is south of the Calf Creek Recreation Area at MP 74.8 where the road embankment is unstable. As shown on Figure 2.4, the proposed improvement includes shifting the road to the east, away from the unstable embankment. A metal W-beam guardrail was placed in the embankment on the west side of the road to keep it from sloughing off. The intent was to place the W-beam inside the embankment so that it would not be exposed. However, it is now visible and exposed to elements which will cause it to rust. If the W-beam fails, it is possible that the roadway pavement will collapse.

The Calf Creek is approximately 45 feet below the road in this area, and the embankment is close to vertical. Additionally, there is a WSA on the west side of the road. It is not feasible to construct a retaining wall to support the roadway on the west side due to the required height of the wall, the proximity to Calf Creek, and the presence of a WSA. On the east side of the road, there is a relatively flat area immediately across from the W-beam and a rock formation immediately to the north.

As shown in Figures 2.4 and 2.4-A, the roadway would be shifted to the east for a length of approximately 600 feet, away from the unstable embankment. To accomplish this, the existing face of the rock formation would be moved east through the blasting and ripping of rock with heavy equipment. The existing face of the rock formation was created in the same manner when the road was originally built. After weathering, the new face would appear similar to the existing face.

Approximately 10 to 20 feet of rock would be removed to shift the roadway away from the unstable embankment. This would accommodate a 12-foot travel lane in each direction, four-foot paved shoulders, and a ten-foot roadside ditch for drainage and rock fall catchment. Rocks fall from the slope above the road at this location, especially in the spring when the soils are wet. A ditch would provide space for the rocks to land and for rock storage until maintenance crews could remove them. The rock cut would be close to vertical with a maximum excavated height of approximately 60 feet.

Stabilize Roadside at MP 75.4

There is a sharp 90-degree curve immediately north of the Calf Creek Recreation Area at MP 75.4, where the existing concrete Jersey barrier on the west side of the road is not adequately supported. According to standards, there should be at least one foot of pavement behind the barrier for deflection in case it is hit. There is currently not one foot of pavement for deflection behind this barrier, and, in some areas, there is not pavement directly beneath the entire width of the barrier.

This improvement would include widening the pavement to provide adequate support for a stable roadside barrier. On the west side of the road at this location is the Calf Creek Recreation Area and a WSA; the WSA boundary is defined by the existing toe of slope. On the east side of the road is a rock outcropping. There are two design options under consideration for stabilization at this location: Option 1—widen to the east through rock removal—and Option 2—widen to the west with a retaining wall. It is the intent of this EA to evaluate both options in sufficient detail to allow for flexibility during the design phase. Both options meet the project's purpose and need, and both would have similar impacts to resources, except as noted below. Both options discussed below would replace the existing concrete Jersey barrier with an aesthetic barrier.

Roadside Stabilization at MP 75.4 Option 1—Rock Removal

As shown on Figure 2.5, Option 1 involves widening the roadway to the east to provide sufficient width to adequately support a stable barrier.

The center stripe of the roadway would be shifted to the east for a length of approximately 300 feet. The west edge of pavement would remain at the existing location, and the west embankment would not be modified. To accomplish this, part of the rock outcropping would be removed through the blasting and ripping of rock with heavy equipment. The existing face was created in the same manner when the road was originally built.

As shown in Figure 2.5-A, rock would be removed to accommodate a 12-foot travel lane in each direction, four-foot paved shoulders, a two-foot barrier offset, and an aesthetic barrier on the outside of the curve. During design, an evaluation will take place to determine whether or not it is possible to reduce the roadway width by eliminating the two-foot barrier offset. Additionally, a geotechnical investigation would determine the stability of the material. A steeper face is preferable because it would minimize the amount of rock removal required. This evaluation would determine how close to vertical the excavated face of the rock cut could be without compromising stability. Figures 2.5, 2.5-A, and the graphic simulations shown below assume a 0.5:1 (horizontal:vertical) rock face.

For roughly two-thirds (or 200 feet) of the improvement's length on the south end of the curve, approximately five feet of rock would be removed. This would be measured horizontally at the

top of the rock face. The excavated height would be 20 feet measured vertically. This excavated section is illustrated in Graphic 2.3 below as well as in Cross-Section A-A in Figure 2.5-A. For approximately 80 feet on the north end of the curve, there is a higher section of rock adjacent to the road. In this area, approximately 30 feet of rock would be removed with a maximum excavated height of 55 feet. The amount of rock removed would also be measured horizontally at the top of the rock face. This excavated section is illustrated in Graphic 2.4 below as well as in Cross-Section B-B on Figure 2.5-A.

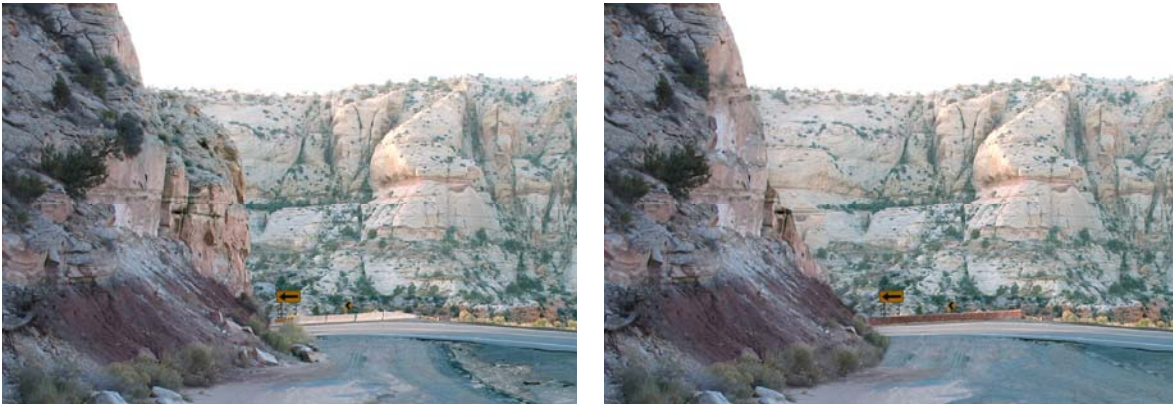
Existing photographs of the area have been digitally altered to illustrate what this option could look like. The aesthetic barriers in these simulations are 36-inches high. Graphic 2.3 shows a view looking north toward the south side of the curve where the rock next to the road is lower. This photo has been altered to show the approximate five feet of rock removal discussed above.

Graphic 2. 3: Roadside Stabilization at MP 75.4 Option 1—Rock Removal (View 1)
Before After



Graphic 2.4 shows a view looking south toward the north end of the curve where the rock next to the road is taller. This graphic shows approximately 30 feet of rock removal, which is measured horizontally, at a 0.5:1 slope. If geotechnical investigations show stable rock material, it may be possible to remove less material by having a steeper slope. The existing slope is close to vertical in this section.

Graphic 2. 4: Roadside Stabilization at MP 75.4 Option 1—Rock Removal (View 2)
Before After



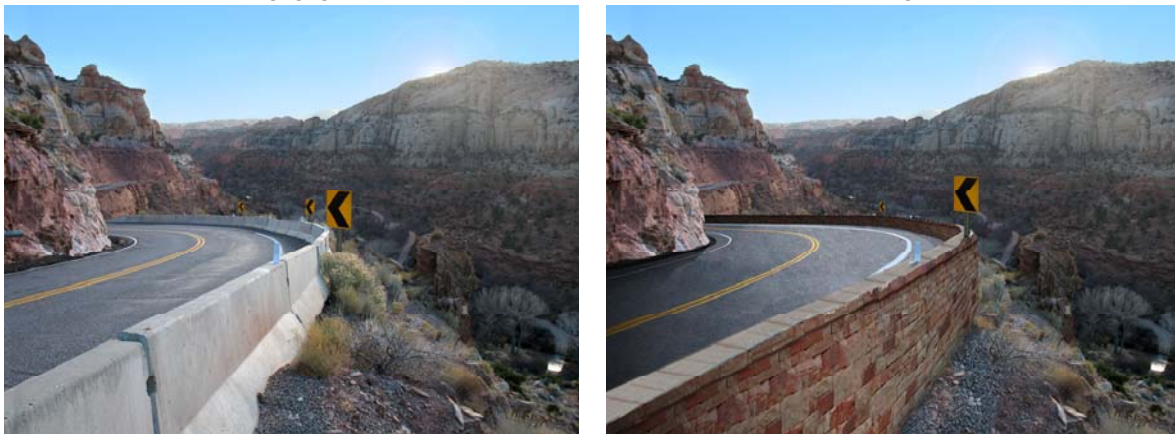
Roadside Stabilization at MP 75.4 Option 2—Retaining Wall

As shown on Figure 2.6, Option 2 involves widening the roadway to the west to provide sufficient width to support a stable barrier. The center stripe of the roadway would be shifted to the west for a length of approximately 400 feet. The east edge of pavement would remain at the existing location, and a retaining wall would be constructed at the top of the existing slope on the west side to accommodate the wider pavement section.

As shown in Figure 2.6-A, a retaining wall would be necessary to accommodate a 12-foot travel lane in each direction, four-foot paved shoulders, a two-foot barrier offset, and a barrier on the outside of the curve. During design, it will be evaluated whether or not it is possible to reduce the roadway width by eliminating the two-foot barrier offset.

An existing photograph of the area has been digitally altered to illustrate what this option could look like. This illustration shows a 36-inch high aesthetic barrier, measured from the pavement to the top of barrier.

Graphic 2. 5: Roadside Stabilization at MP 75.4 Option 2—Retaining Wall
Before After

**Stabilize Roadside at MP 77.5 to MP 77.7**

Between MP 77.5 and 77.7, there is another section where the existing concrete Jersey barrier on the west side of the road is not adequately supported. At this location, there are several sections of exposed W-beam guardrails supporting the embankment directly beneath the Jersey barrier. On the west side of the road at this location is a WSA; the WSA boundary is defined by the existing toe of slope. On the east side of the road is a rock formation.

As shown on Figure 2.7, the roadway would be widened to the east to provide sufficient width to support a stable barrier. The center stripe of the roadway would be shifted east for a length of approximately 1400 feet. The west edge of pavement would remain at the existing location, and the west embankment would not be modified. To accomplish this, rock would be removed through blasting and ripping with heavy equipment. The existing rock face was created in the same manner when the road was originally built.

As shown in Figure 2.7-A, up to 22 feet of rock, when measured horizontally, would be removed to accommodate a 12-foot travel lane in each direction, four-foot paved shoulders, a two-foot barrier offset, and a barrier on the west side of the road. As discussed at the beginning of Section 2.5.3, the existing concrete Jersey barrier would be replaced with an aesthetic barrier between 18 and 36 inches high. The rock cut would be 0.5:1 with a maximum excavated height of approximately 35 feet. During design, it will be evaluated whether or not it is possible to reduce the roadway width by eliminating the two-foot barrier offset.

An existing photograph of the area has been digitally altered to illustrate that this option would look similar to the existing rock face. Graphic 2.6 shows a view looking north. This photo has been altered to show approximately 18 feet of rock removal in the right foreground. This rock removal is measured horizontally at the top of the rock, at a 0.5:1 slope. If geotechnical investigations show stable rock material, it may be possible to remove less material by having a steeper slope. The existing slope is close to vertical in this section.

Graphic 2. 6: Roadside Stabilization from MP 77.5 to MP 77.7
Before After



Widening to the west to provide sufficient width for a barrier was initially considered. This option would shift the center stripe of the roadway west for a length of approximately 1500 feet. The east edge of pavement would remain at the existing location, and a retaining wall would be constructed at the top of the existing slope on the west side to accommodate the wider pavement section.

A retaining wall would be necessary to accommodate a 12-foot travel lane in each direction, four-foot paved shoulders, a two-foot barrier offset, and a barrier on the west side of the road. The wall would have a maximum height of 20 feet with a barrier on top. The wall would be visible to hikers in the canyons below. Long-term maintenance on the wall would be required.

A survey of cultural resources identified segments of historic road in this area. The historic road was constructed by the CCC in the 1930s as a public works project. There is a cobble rock wall on the west side and several hand-carved drainage ditches on the east side. The wall is considered to have a higher value than the ditches. Widening to the west would impact the entire cobble rock wall, while widening to the east would impact a portion (approximately 15 feet) of four of the six drainage ditches.

The retaining wall option was eliminated for the following reasons:

- Greater impacts to historic resources
- Greater visual impacts
- Greater long term maintenance requirements

2.5.4 Provide Slow-Vehicle Turnouts

This improvement would involve constructing turnouts to allow slow-moving vehicles to pull aside and give vehicles behind them an opportunity to pass. Turnouts are not as long as passing lanes; they are intended to relieve a queue and assist with preventing driver frustration. Although capacity is not a problem on SR-12, public input clearly indicated the need to address safety related to different types of vehicle traffic that move at different speeds. The proposed turnouts are typically used in national parks. Crash severity is greatest when vehicles are traveling at different speeds, especially when speeds differ by 15 mph or more. Turnouts are proposed to address the project's purpose: to accommodate the wide range of corridor users.

Due to the terrain—a curvy road with vertical rock walls—opportunities for drivers to pass along the corridor are limited by sight distance. The different user types, including tourists in large recreational vehicles (RVs) traveling slowly and local commuters traveling at a faster speed, can result in queued vehicles. Vehicles may be stuck behind a truck or large RV for long distances without safe passing opportunities, which can lead to frustration and can increase the probability of drivers taking risks to pass.

The turnout locations have been proposed in areas where sight distance does not safely allow for passing by crossing the centerline, where impacts would be minimized, and where it is likely that queues would develop. Queues are more likely to develop after sections with steep grades, sharp curves, or limited sight distance where passing opportunities are constrained. For example, tourists drive the Hogsback very slowly, and passing is extremely difficult due to the narrow curving roadway. The location for the proposed eastbound turnout at MP 79.5 was selected because it is the first safe opportunity for faster moving vehicles stuck behind slower moving vehicles to pass. The terrain flattens out, sight distance increases, and the roadway straightens. This improvement is included in the Build Alternative at six different locations (Improvements 4a through 4f on Figure 2.1). The locations are also listed in Table 2.3 and shown in Figures 2.8 through 2.13.

The turnout would consist of an additional 12-foot lane with a four-foot shoulder, for a recommended length of 300 to 600 feet. The proposed eastbound turnout at MP 76.2 is in more constrained terrain and is therefore shorter in length to minimize impacts.

Table 2. 3: Proposed Turnouts

MP	Direction	Location	Length	Figure
69.9	Westbound	Uphill section just past Spencer Flats Road (Improvement 4a)	600'	2.8, 2.8-A
71.7	Eastbound	Uphill in the Camelbacks due to the rolling hills (Improvement 4b)	600'	2.9, 2.9-A
72.5	Westbound	Uphill section just past the Boynton Overlook Wayside (Improvement 4c)	600'	2.10, 2.10-A
76.2	Eastbound	Uphill section (Improvement 4d)	300'	2.11, 2.11-A

MP	Direction	Location	Length	Figure
79.5	Eastbound	South end of New Home Bench, just north of the Hogsback(Improvement 4e)	600'	2.12, 2.12-A
83.0	Westbound	North end of New Home Bench, just south of Hell's Backbone Road(Improvement 4f)	600'	2.13, 2.13-A

2.5.5 Improve Intersections

This improvement would address the project's purpose to improve safety at deficient roadway locations through the construction of turning lanes. Vehicles turning onto and off of SR-12 cause a speed discrepancy with vehicles traveling through these intersections. Without lanes for turning, acceleration, or deceleration, conflicts occur. This improvement is included in the Build Alternative at two intersections: Hole-in-the-Rock Road at MP 64.4 (Improvement 5a on Figure 2.1) and Calf Creek Recreation Area at MP 75.0 (Improvement 5b on Figure 2.1), as discussed in the following sections.

Hole-in-the-Rock Road at MP 64.4

There are currently no turning lanes provided at the intersection of SR-12 and Hole-in-the-Rock Road. Turning movements at this location are compounded by limited sight distance; the intersection is located on a horizontal curve. Vehicles are traveling at high speeds at this location, and the posted speed is 60 mph. Accident data shows a cluster of accidents at this intersection.

As shown on Figures 2.14 and 2.14-A, proposed improvements include widening the roadway to accommodate the addition of turning lanes. The total length of reconstruction would be approximately 2700 feet.

Vehicles traveling from Escalante eastbound to Hole-in-the-Rock Road would be provided with a right-hand turn lane. This turn lane would be 12-feet wide with a four-foot shoulder and would be approximately 300-feet long. Vehicles traveling from Hole-in-the-Rock Road westbound to Escalante would be provided with a 12-foot median acceleration lane for approximately 660 feet. Vehicles traveling from Boulder westbound to Hole-in-the-Rock Road would be provided with a 12-foot median turn lane for approximately 500 feet. Proposed improvements are within UDOT's existing right-of-way at this location.

Calf Creek Recreation Area at MP 75.0

Similar to Hole-in-the-Rock Road, there are currently no turning lanes provided at the intersection of SR-12 and the Calf Creek Recreation Area access road. This intersection is highly skewed due to the steep terrain leading down to the recreation area. The grade of SR-12 is also very steep at this location. These factors result in an undesirable situation; larger vehicles headed westbound must cross the centerline to negotiate the turn into the recreation area. Sight distance at this location is limited due to horizontal curves and vertical rock walls.

On the west side of the road is the Calf Creek Recreation Area and a WSA. The WSA boundary is defined by the recreation area access road's toe of slope. On the east side of the road, the terrain alternates between a vertical face cut into a rock formation and an embankment placed across a dry wash, which is regulated by USACE.

As shown on Figures 2.15 and 2.15-A, the Build Alternative improvement at this location involves shifting the roadway to the east and widening it to accommodate the addition of turning

lanes. The access road would not be realigned; the west edge of pavement would remain at the existing location and the WSA would not be impacted. The east edge of pavement would be shifted approximately 18 feet to the east. The total length of reconstruction would be approximately 900 feet.

Vehicles traveling from Escalante eastbound to the Calf Creek Recreation Area would be provided a 12-foot median left turn lane approximately 215-feet long. Vehicles traveling from Boulder westbound to the Calf Creek Recreation Area would be provided a 12-foot right turn lane for approximately 400 feet. This length is the total length required to develop the turning lanes.

To accommodate these improvements, impacts to the east side of the road would include both cut (i.e., rock removal) and fill. Rock removal would be required for approximately 250 feet total. For impact analysis in this EA, a 0.5:1 (horizontal:vertical) excavated rock face was assumed. During design and construction, a geotechnical investigation would determine the stability of the material. This evaluation would determine how close to vertical the excavated face of the rock cut could be without compromising stability. A steeper face is preferable because it would minimize the amount of rock removal required. Currently, the existing face is close to vertical in this location. Under this improvement, one section of the excavated face would range from 50 to 100 feet high, measured vertically, for approximately 150 feet. However, if the geotechnical investigation determined a vertical rock face would be stable, the height of this excavated face would be reduced to between 25 and 50 feet measured vertically. In another section that is approximately 100-feet long, the excavated face would range from 10 feet to 30 feet high measured vertically, assuming a 0.5:1 slope. Again, this height would be reduced to 5 feet to 15 feet if the geotechnical investigation determined a vertical rock face would be stable in this area. Fill would be required for approximately 350 feet. The maximum fill height would be approximately 25 feet.

2.5.6 Widen Curve at MP 71.0

This improvement would address the project's purpose to improve safety at locations where the roadway is deficient. There is a narrow curve at MP 71.0 referred to as "The Tank" because of a natural water pocket adjacent to the road. Curve widening is proposed at this location (Improvement 6 on Figure 2.1). The roadway curves sharply around a rock outcropping. The existing roadway width does not allow for two large vehicles traveling in opposite directions to safely pass. During snow removal operations, the plow blade extends across the centerline into the opposite travel lane. This hazard is exacerbated by limited sight distance as the road curves around the rock. The Utah Highway Patrol's accident data from 1993 to 2003 was plotted along the corridor. There were several accidents at this curve, indicating a problem. Most accidents appear to result from drivers not anticipating the curve and then running off the road because of excessive speed.

On the outside (east) of this curve is a WSA; on the inside (west) is the rock outcropping. As shown on Figure 2.16 and 2.16-A, the Build Alternative improvement at this location involves rock removal on the inside of the curve. Widening to the inside would improve sight distance and avoid impacts to the WSA. Widening would accommodate a 12-foot travel lane in each direction and four-foot shoulders.

Although realignment of the horizontal curve is not included in the Build Alternative, UDOT is requesting additional right-of-way at this curve. If, in the future, accident data indicates a need for realignment, the right-of-way will be available. The curve currently meets the 3R design standards minimum; the design speed is within 15 mph of the posted speed limit. However, this curve stands apart from others along the corridor because it is a very tight curve with fairly straight sections on either side of it.

2.5.7 Improve Signing

This improvement would address the project's purpose to accommodate the wide range of corridor users and to improve safety at locations where the roadway is deficient. Enhanced signing improves safety by increasing awareness. Motorists would be advised to watch for bicyclists and to use caution in areas where sight distance is limited, animals are likely to be present, or the speed limit changes abruptly.

Also, signing for shared bicycle use would help to accommodate the wide range of corridor users. Creative approaches to signing for shared bicycle use have been used in other canyon environments and will be evaluated in more detail during design. For example, one canyon in Colorado has a push button activated flashing sign that reads, "Bikes present in canyon when flashing."

Signing for wildlife would alert motorists to use caution in locations of accident clusters (MP 61.5 to MP 62) and winter range (between MP 61 and MP 67 and between MP 82 and 86). Signing in areas with roadway deficiencies—such as limited sight distance, sharp curves, steep drop-offs, and narrow shoulders—would alert motorists to use caution.

As recommended in the *Scenic Byway 12 Corridor Management Plan*, this improvement involves development of a comprehensive signing plan to address the following:

- Installation of new signs related to bicyclists, animal presence, and roadside hazards to improve safety
- Replacement of deteriorated signs
- Removal of ineffective signs

Signage would follow the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) for standards regarding size and color. When funding becomes available, a comprehensive signage plan would be developed to do the following:

- Determine if and where new signage is needed
- Consolidate and remove extraneous signs to reduce the visual clutter they cause
- Address consistency in design, style, materials, wording, and color

2.6 PREFERRED ALTERNATIVE

UDOT and FHWA have identified the Build Alternative as the Preferred Alternative. The list of improvements included in the Build Alternative and discussed above in Sections 2.5.1 through 2.5.7 are numbered below. These numbers correspond to the improvement's location on Figure 2.1.

- 1) Obtain right-of-way from MP 68.9 to MP 83.1, where it is currently defined by RS-2477.
- 2) Replace Calf Creek Bridge at MP 74.5.

- 3) Stabilize roadway at three locations where embankment or barrier is failing:
 - MP 74.8 (3a).
 - MP 75.4 (3b).
 - MP 77.5 to 77.7 (3c).
- 4) Provide six slow-vehicle turnouts, which are intended to allow slow-moving vehicles to pull aside and let other vehicles pass (they are not intended for parking):
 - Eastbound at MP 71.7, 76.2, and 79.5 (4b, 4d, and 4e).
 - Westbound at MP 69.9, 72.5, and 83.0 (4a, 4c, and 4f).
- 5) Improve two intersections:
 - Hole-in-the-Rock Road at MP 64.4 (5a).
 - Calf Creek Recreation Area at MP 75.0 (5b).
- 6) Widen roadway at narrow curve known as “The Tank,” located at MP 71.0.
- 7) Improve signing for bicycles, animal presence, and roadside hazards along the entire corridor. (Specific locations will be determined during design so these are not depicted on the map.)

These improvements are being assessed collectively; one improvement would not be selected in lieu of another. Public comments will be considered during the public review and comment period.

The Build Alternative best meets the purpose of the SR-12 project and would accomplish the project objectives:

- Provide adequate space for UDOT to perform ongoing maintenance operations on the roadway and supporting infrastructure
- Improve safety and infrastructure where the roadway facilities are deficient or deteriorating
- Accommodate the wide range of corridor users

By acquiring sufficient right-of-way, maintenance operations would be greatly simplified because the nebulous RS-2477 right-of-way width would be replaced with a 200-foot wide right-of-way corridor. This would allow UDOT maintenance crews to clearly understand where maintenance is allowed.

By providing spot improvements at deteriorating roadway locations along SR-12—such as the Calf Creek Bridge, the inadequately supported embankment at MP 74.8, and the inadequately supported barrier at MP 75.4 and from MP 77.5 to 77.7—infrastructure as well as safety would improve. Bridge parapets and aesthetic barriers would be designed to meet crash test requirements. Safety at deficient intersections, such as Hole-in-the-Rock Road and the Calf Creek Recreation Area, would improve with the addition of lanes to accommodate turning, acceleration, and deceleration. Deficient roadway width on the curve at MP 71.0 would be widened to allow two large vehicles to safely pass. Other locations with deficiencies such as limited sight distance, steep side slopes, and narrow shoulders would be addressed with improved signing.

The wide range of corridor users would be accommodated by providing slow-vehicle turnouts, which would establish safe locations for slow-moving vehicles to pass throughout the corridor. Also, improved signing for shared bicycle use would increase awareness for both bicyclists and motorists therefore improving safety.

2.7 NO-BUILD ALTERNATIVE

The No-Build Alternative maintains the status quo and provides a baseline for comparison to the Build Alternative. The No-Build generally includes all other projects that are funded for improvement in the project area, excluding the Build Alternative. There are currently two other projects on the Statewide Transportation Improvement Program (STIP) in the project area. The *Scenic Byway 12 Signage and Interpretive Master Plan* includes improvements to existing sites and construction of new interpretive sites along SR-12. The Escalante Heritage Visitor Center on the east side of Escalante will chronicle the story of the “Hole-in-the-Rock Pioneers.” Under the No-Build Alternative, these two projects would be constructed. However, none of the improvements included in the Build Alternative would take place.

The No-Build Alternative would not meet the purpose of the project:

- Provide adequate space for UDOT to perform ongoing maintenance operations on the roadway and supporting infrastructure
- Improve safety and infrastructure where the roadway facilities are deficient or deteriorating
- Accommodate the wide range of corridor users

The No-Build Alternative would result in a segmented, inefficient approach to necessary safety and maintenance needs. Right-of-way would remain ill-defined, which means a continued uncertainty regarding the boundary’s location at the “edge of disturbance.” Inter-agency confusion regarding which maintenance activities are acceptable would continue. Any maintenance beyond the existing toe of slope would be difficult, if not impossible, to achieve. The level of maintenance necessary to adequately maintain the road could not be provided.

The safety would not be improved at locations where the roadway is deteriorating:

- The Calf Creek Bridge would continue to deteriorate. Scour would continue to undermine the southwest bridge abutment. Shoulder width and bridge parapets would continue to not meet standards.
- Roadway embankment would not be stabilized at MP 74.8.
- Existing barriers at MP 75.4 and from MP 77.5 to MP 77.7 would continue to deteriorate. Over time, risk associated with barrier failure would increase.
- Potential for impatient drivers to take risks after being stuck behind slow-moving vehicles for long distances would remain.
- Potential for conflict between turning and through movements would remain at the Hole-in-the-Rock Road or Calf Creek Recreation Area intersections.
- The risk of a collision between two large vehicles traveling in opposite directions at the narrow curve at MP 71.0 would remain.

2.8 TSM/TDM ALTERNATIVE

Transportation Systems Management (TSM) generally refers to strategies that increase the efficiency of existing facilities (i.e., optimization techniques that do not require new infrastructure). Examples of these strategies could include ramp metering, traffic signal coordination, and turning lanes. Travel Demand Management (TDM) refers to strategies that encourage changes in driving behavior, including avoiding peak travel times or changing modes.

Examples include flex-time work hours, ride sharing, and parking pricing. TDM could also include strategies to reduce the number of vehicles using existing facilities, such as encouraging walking, bicycling, and transit.

These TSM and TDM strategies are generally undertaken for projects where capacity is an issue. As discussed in Chapter 1, capacity is not an issue on SR-12; TSM and TDM strategies are not applicable.

The two alternatives to be carried forward for detailed review are the Build Alternative and the No-Build Alternative, as discussed in Sections 2.5 through 2.7.

2.9 FUTURE TRANSPORTATION CONDITIONS

As discussed in Chapter 1, additional capacity is not part of the project's purpose and need. SR-12 currently operates at a level of service (LOS) A and is expected to operate at an acceptable LOS B by 2030 with or without this proposed project.

Travel time was not quantified for the Build Alternative or for the No-Build Alternative because capacity is not an issue on the corridor. Travel time and delay is more closely related to conflicts with differing user groups. Commuting vehicles desire to travel the corridor quickly; recreational vehicles and trucks travel the corridor at a much slower pace. By providing slow-vehicle turnouts to allow for the passing of slow-moving vehicles, the Build Alternative would alleviate problems associated with differing user groups—including delay, queues behind slow-moving vehicles, and potential accidents resulting from frustrated drivers attempting to pass under unsafe conditions. Under the No-Build Alternative, a lack of safe passing opportunities would result in delay, queues behind slow-moving vehicles, and potential accidents.

NO.	MILE POST	IMPROVEMENT	FIGURE
PROPOSED RIGHT OF WAY			
1	68.9 to 83.1	SR-12 Corridor	2.2, sheet 1 to 4
1a	82.1	Stockpile Site	2.2, sheet 4
PROPOSED SPOT IMPROVEMENTS			
2	74.5	Replace Calf Creek Bridge	2.3
3		STABILIZE ROADWAY AND ROADSIDE	
3a	74.8	Stabilize Roadway	2.4, 2.4-A
3b	75.4	Stabilize Roadside	2.5 to 2.6-A
3c	77.5 to 77.7	Stabilize Roadside	2.7, 2.7-A
4		PROVIDE SLOW VEHICLE TURNOUTS	
4a	69.9	Westbound	2.8, 2.8-A
4b	71.7	Eastbound	2.9, 2.9-A
4c	72.5	Westbound	2.10, 2.10-A
4d	76.2	Eastbound	2.11, 2.11-A
4e	79.5	Eastbound	2.12, 2.12-A
4f	83	Westbound	2.13, 2.13-A
5		IMPROVE INTERSECTIONS	
5a	64.4	Hole-in-the-Rock Road	2.14, 2.14-A
5b	75	Calf Creek Recreation Area	2.15, 2.15-A
6	71	Widen Narrow Curve	2.16, 2.16-A
7	*	Improve Signing	

* (locations to be determined during design so these are not depicted on the map)

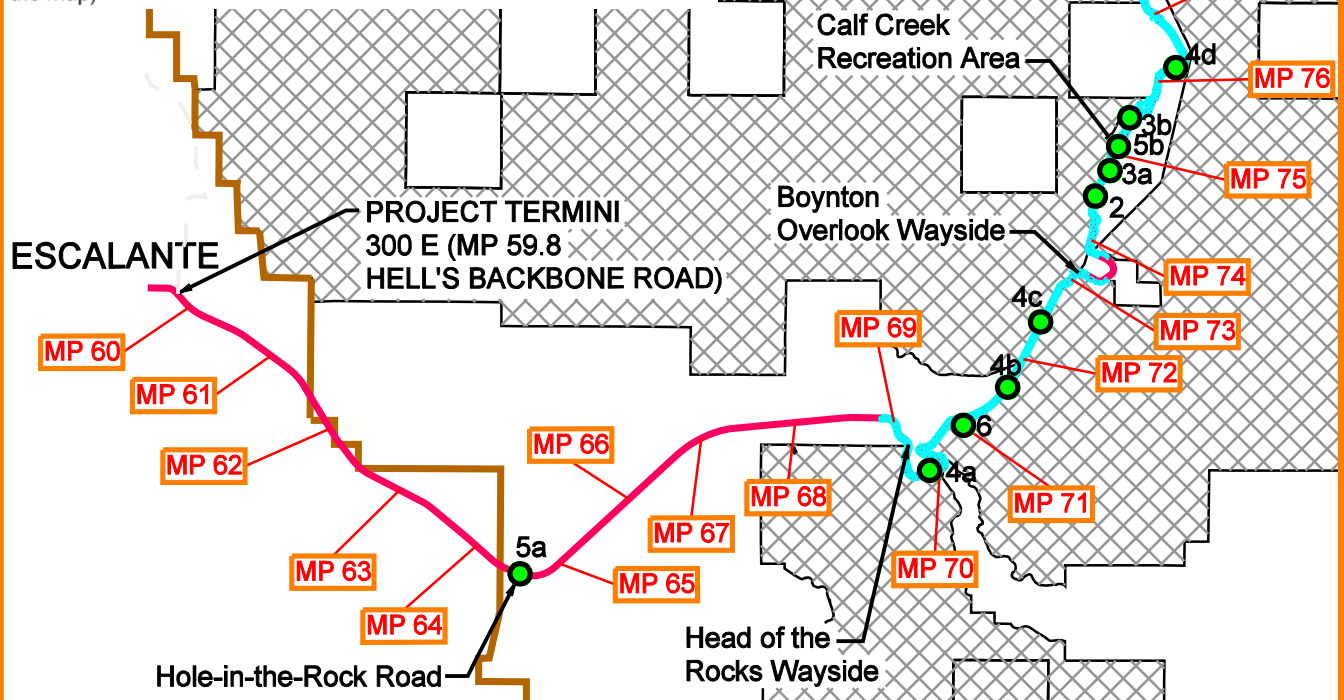


FIGURE 2.1 BUILD ALTERNATIVE

- SR-12 Existing Right-of-Way
- SR-12 Right-of-Way Requested
- # Additional Right-of-Way Requested for Stockpile Site
- # Location of Proposed Spot Improvement
- Wilderness Study Area (WSA) (Boundary is Approximate)
- Grand Staircase - Escalante National Monument Boundary

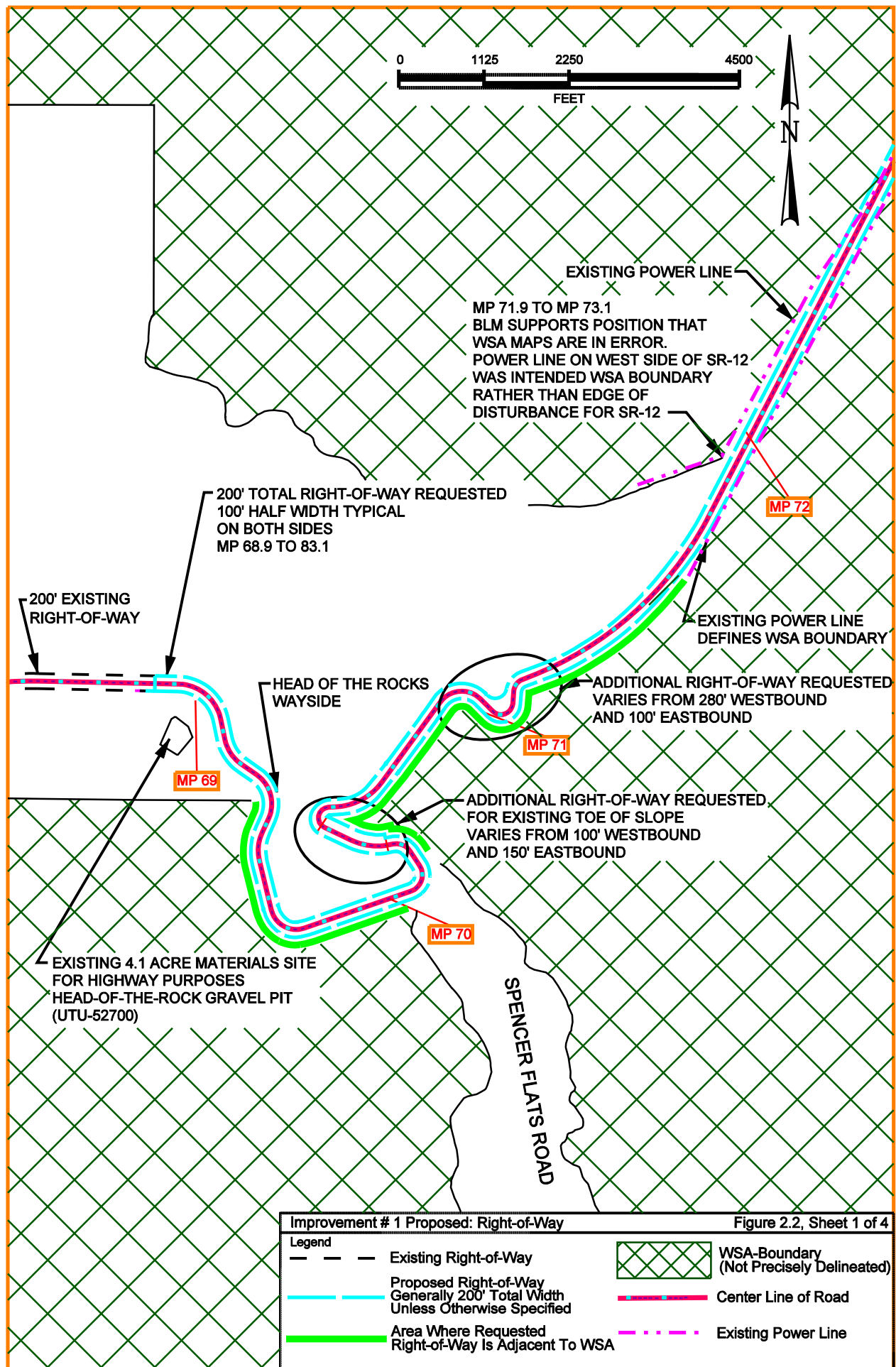
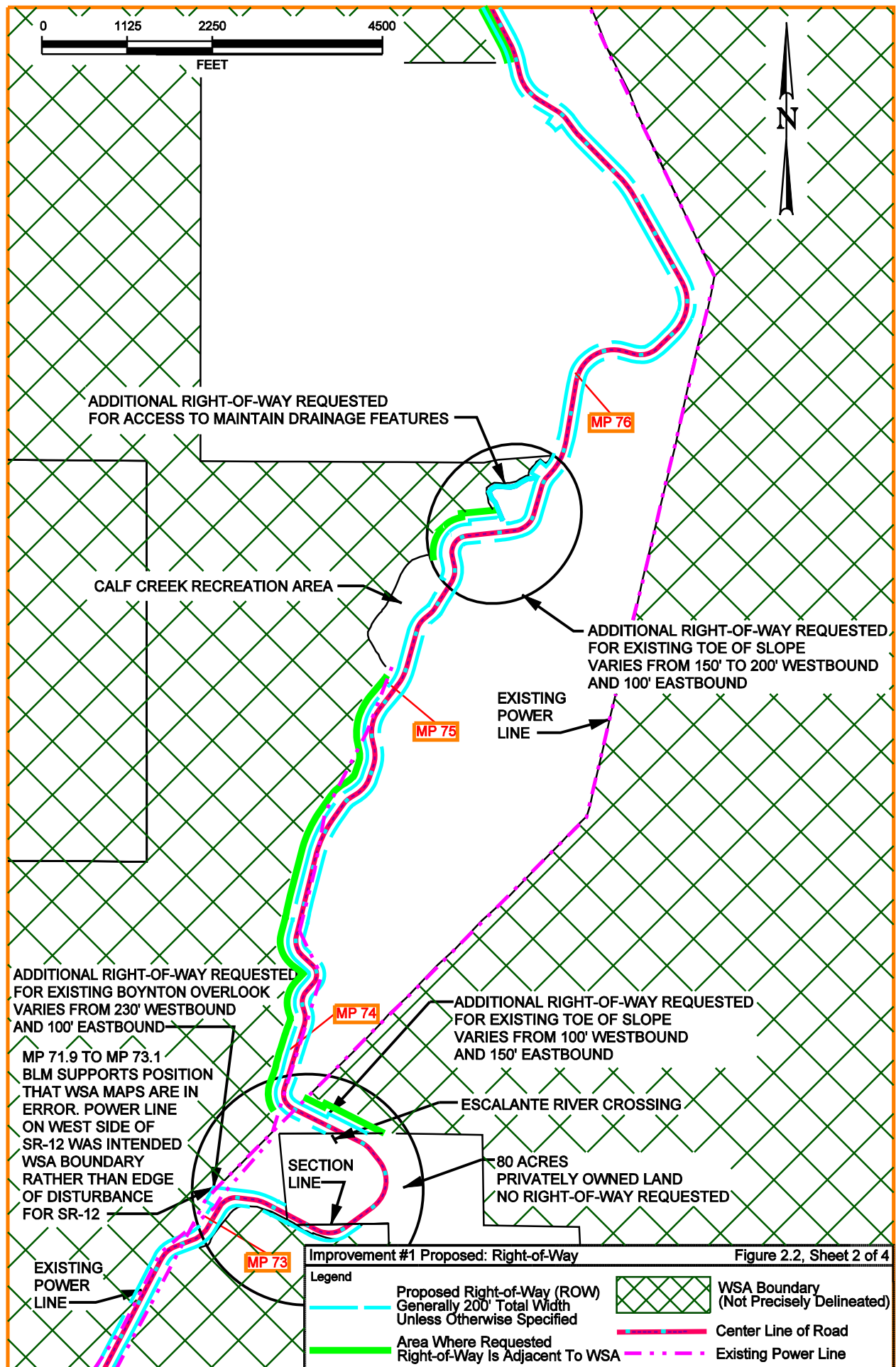
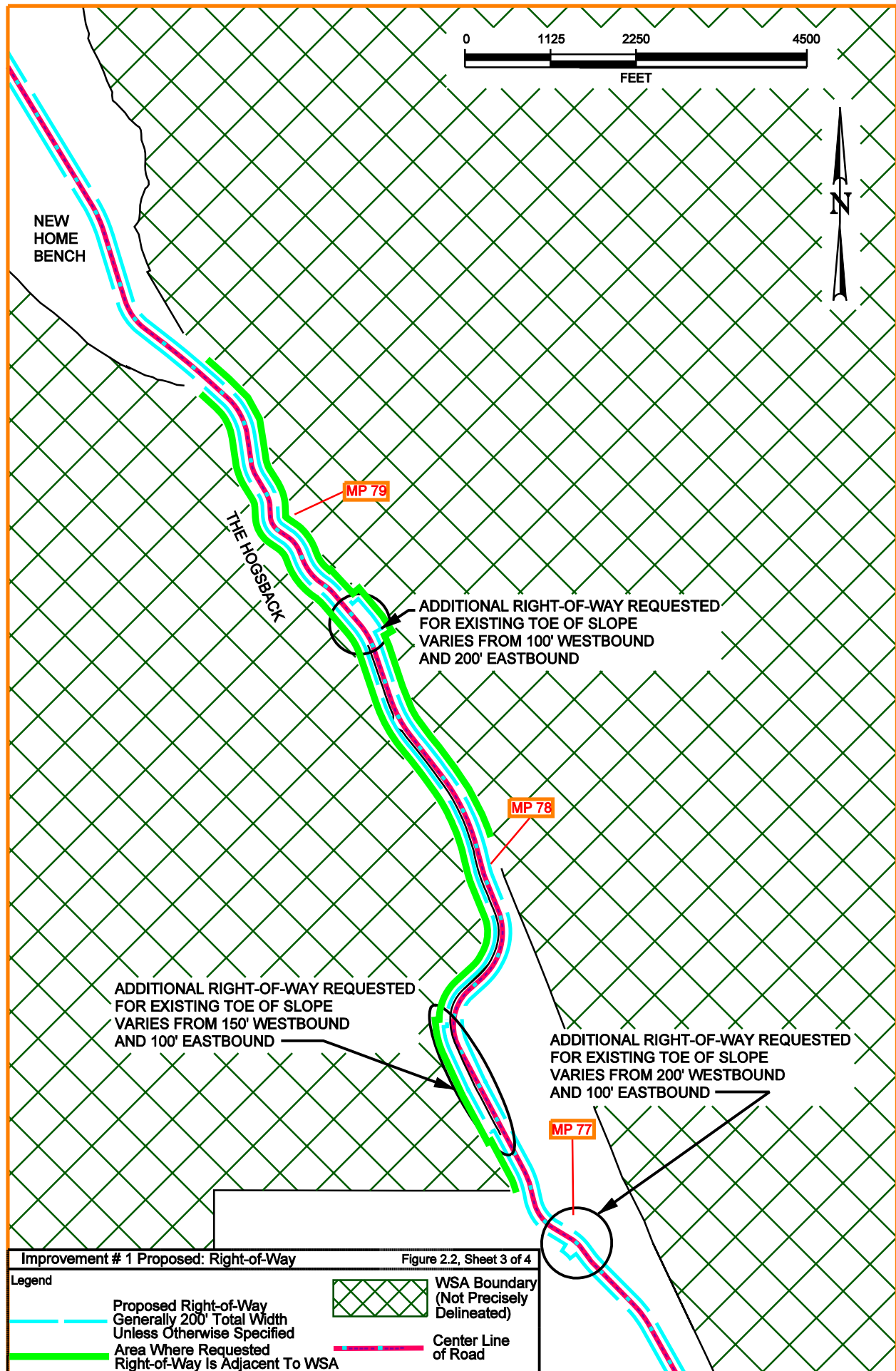
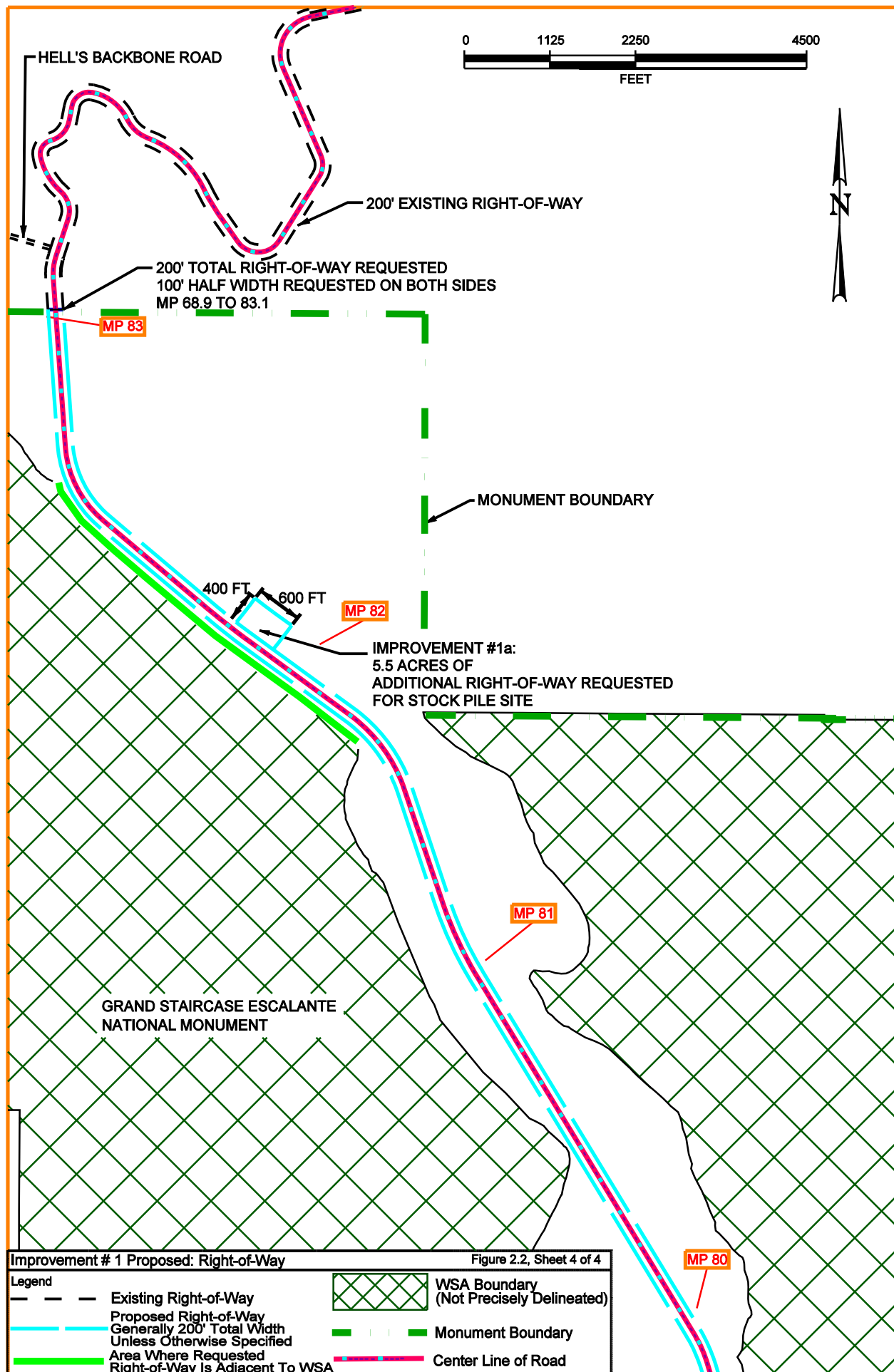
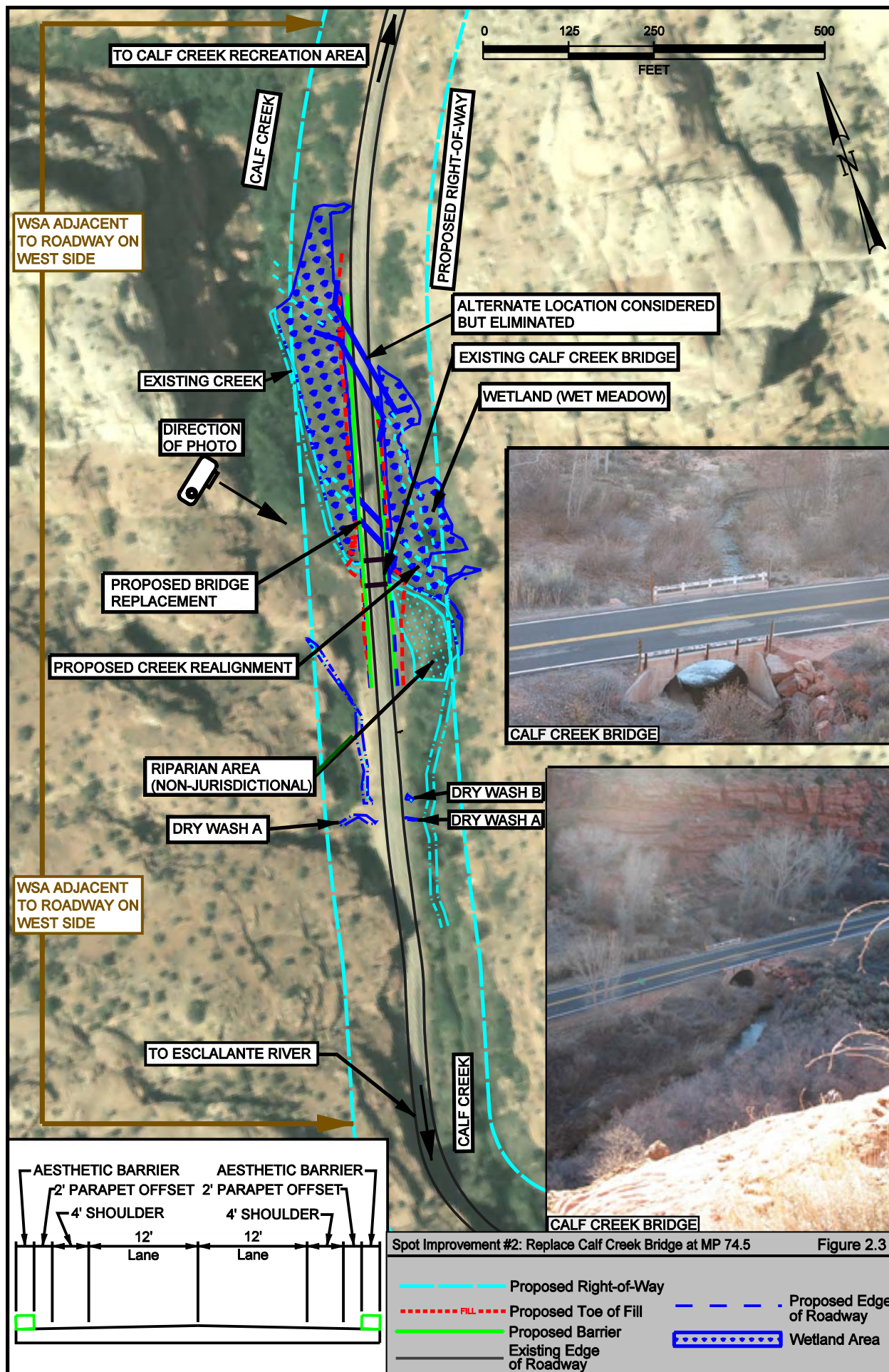


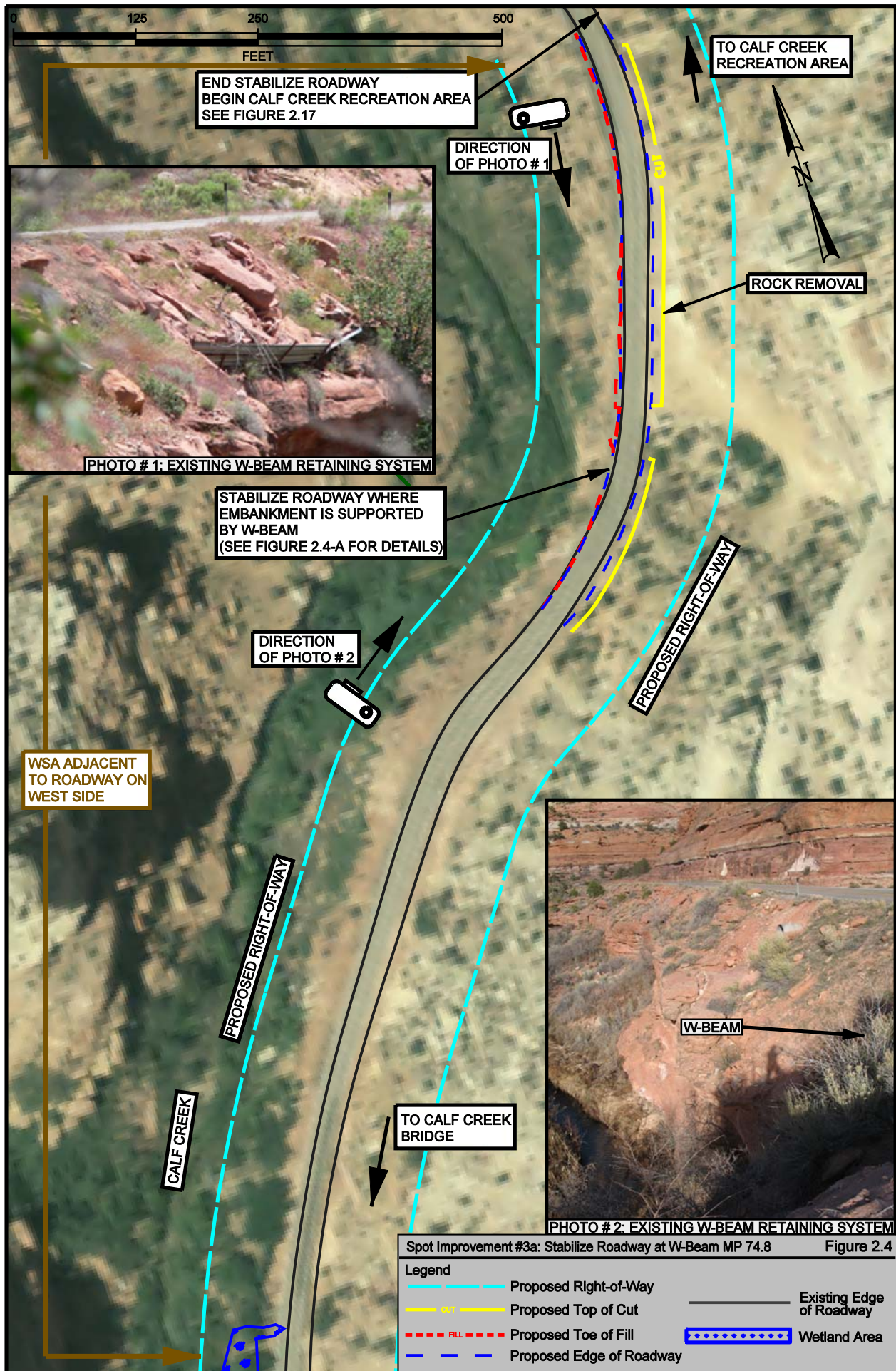
Figure 2.2, Sheet 1 of 4

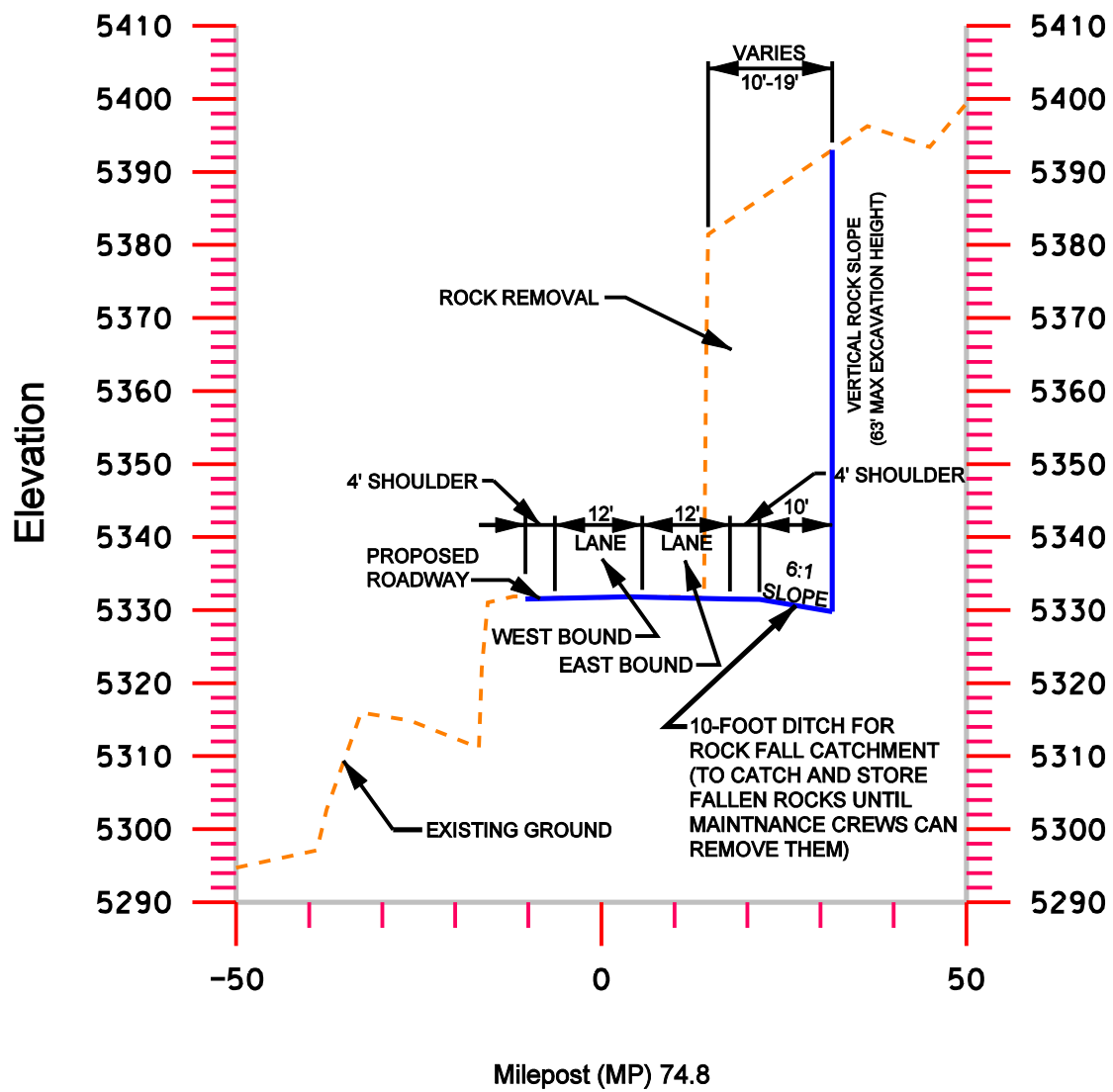


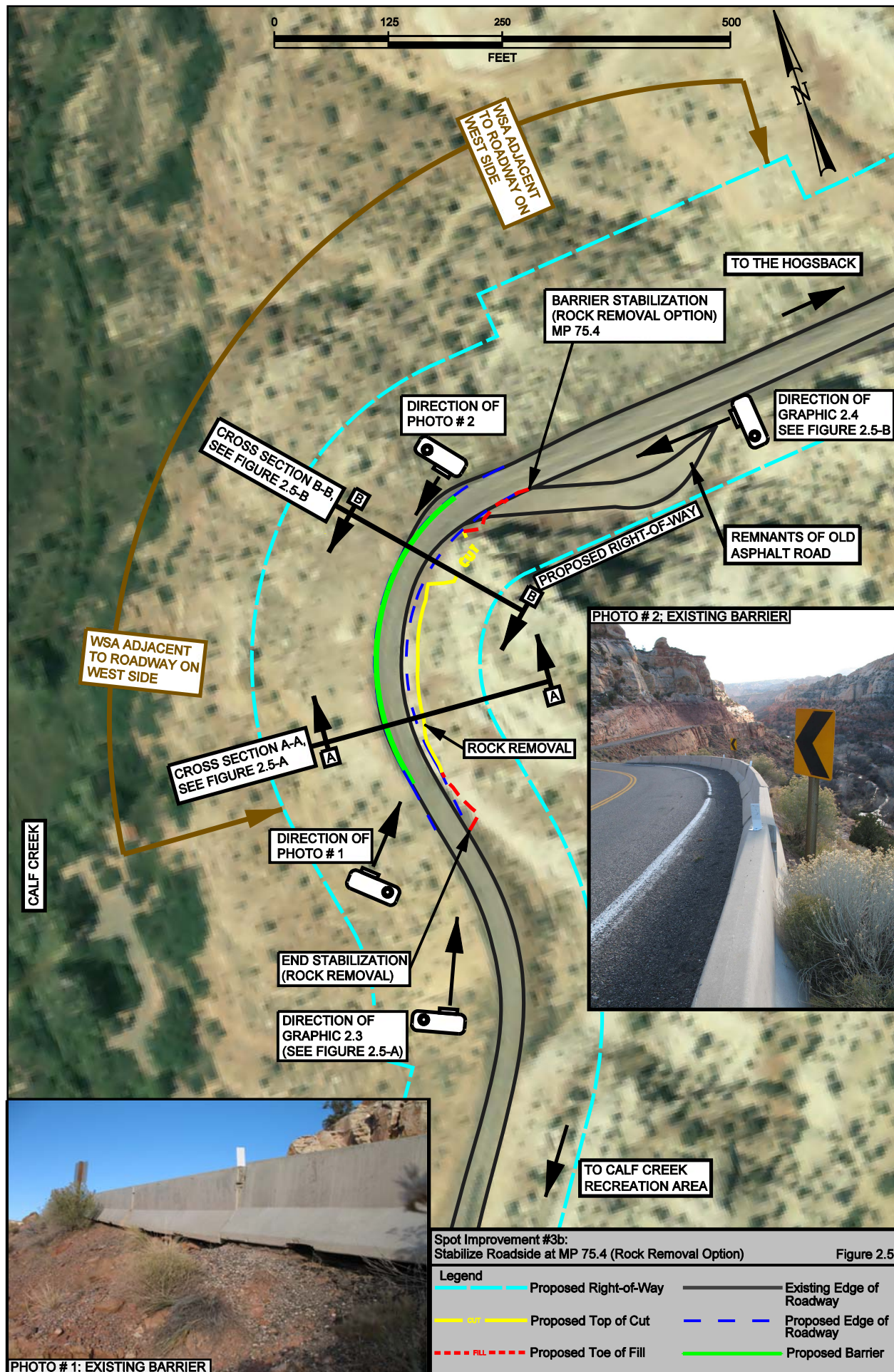


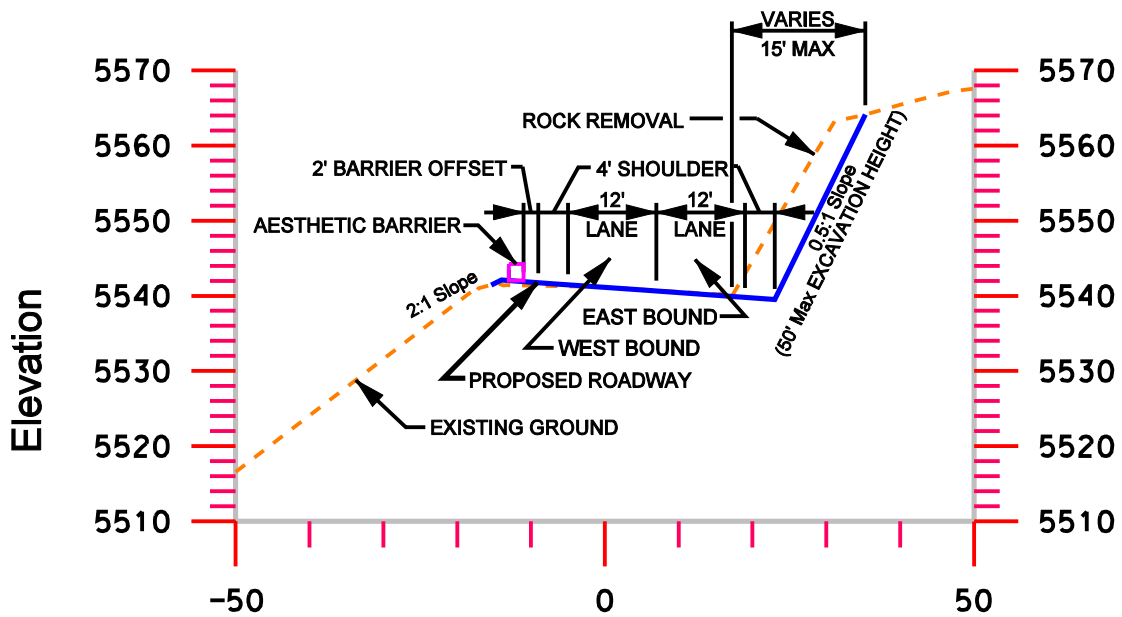










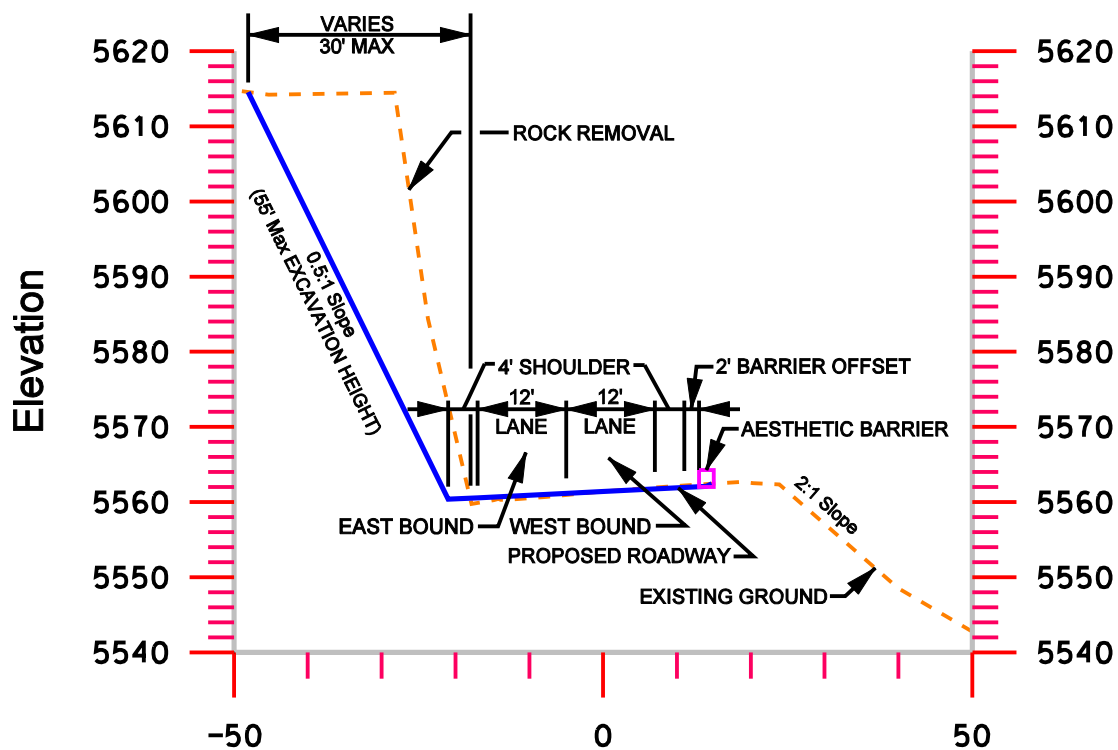


Cross Section (at Location A-A) Rock Removal Option Milepost (MP) 75.4
Typical for Approximately 220-Feet of the Total 300-Foot Long Improvement

Graphic 2.3: Simulation of Roadside Stabilization at MP 75.4 Option 1-Rock Removal (View 1)

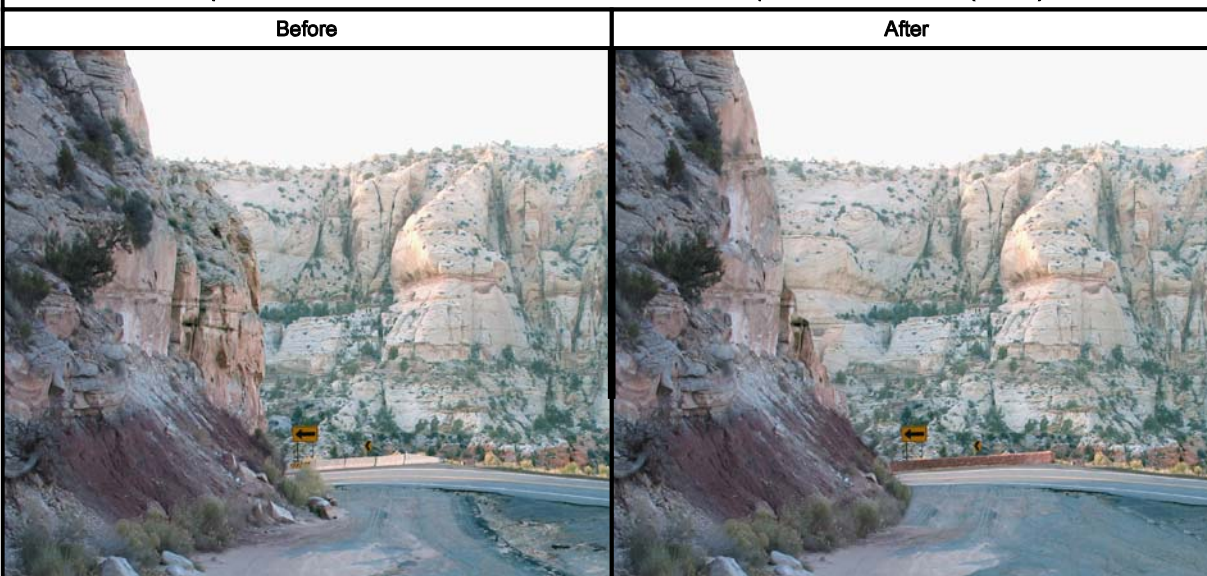


View of Curve From South Looking North

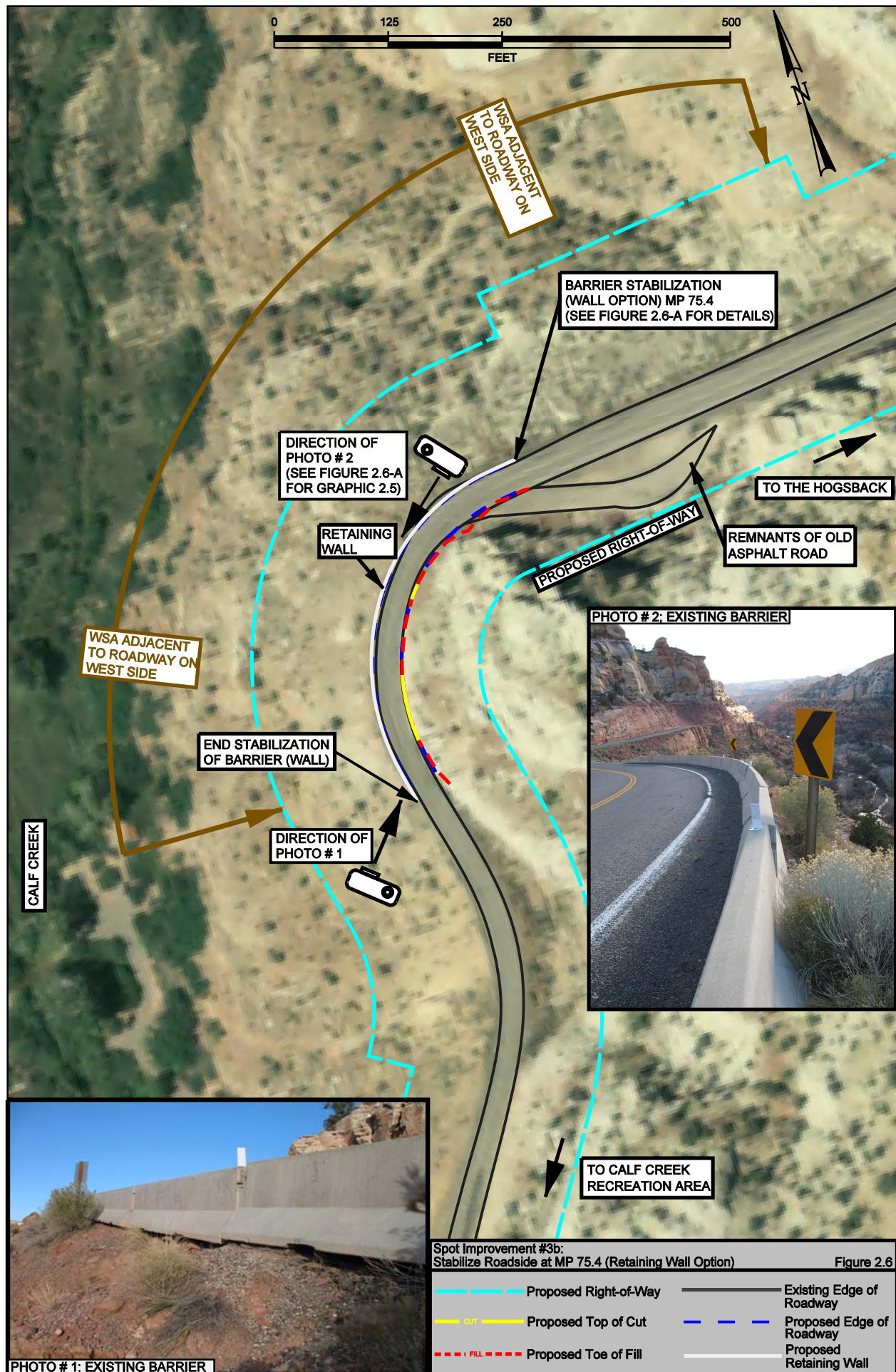


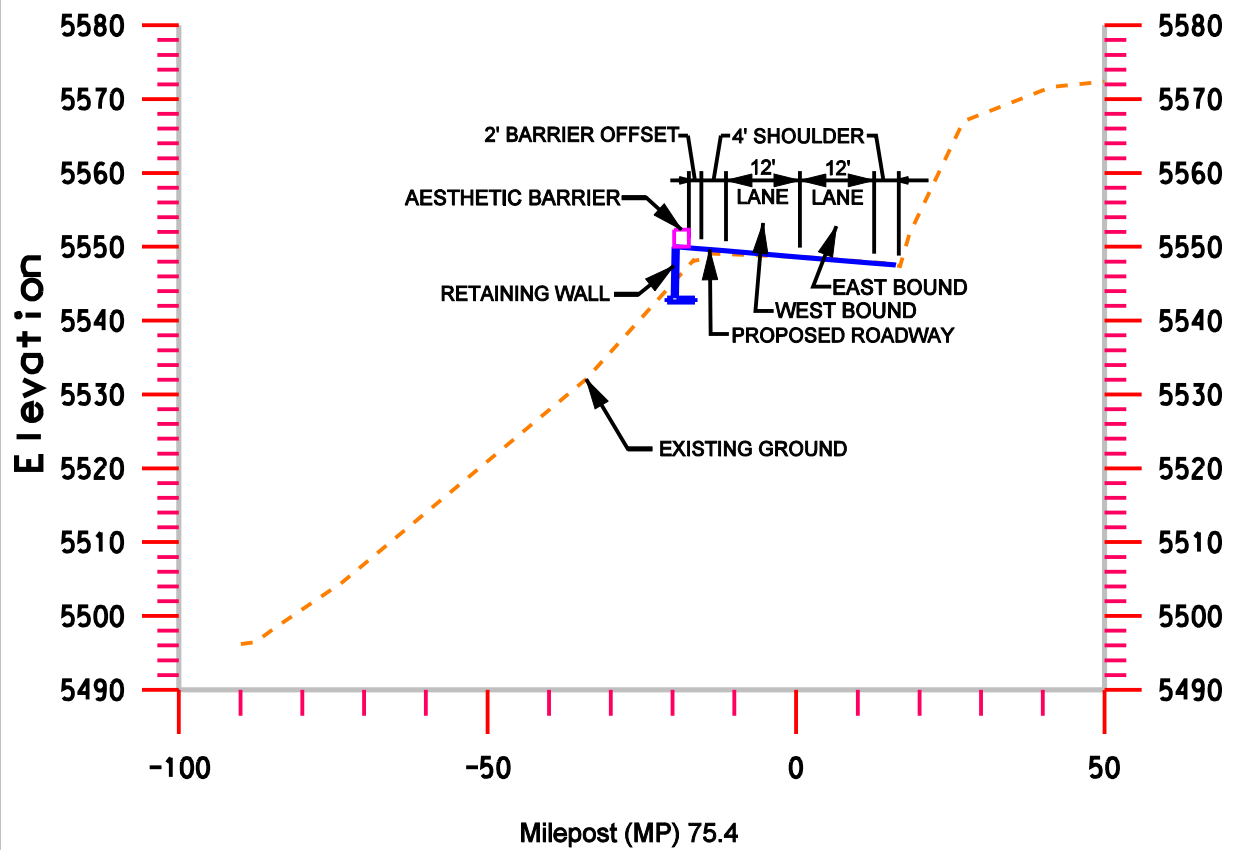
Cross Section (at Location B-B) Rock Removal Option Milepost (MP) 75.4
Typical for Approximately 80-Feet of the Total 300-Foot Long Improvement

Graphic 2.4: Simulation of Roadside Stabilization at MP 75.4 Option 1-Rock Removal (View 2)



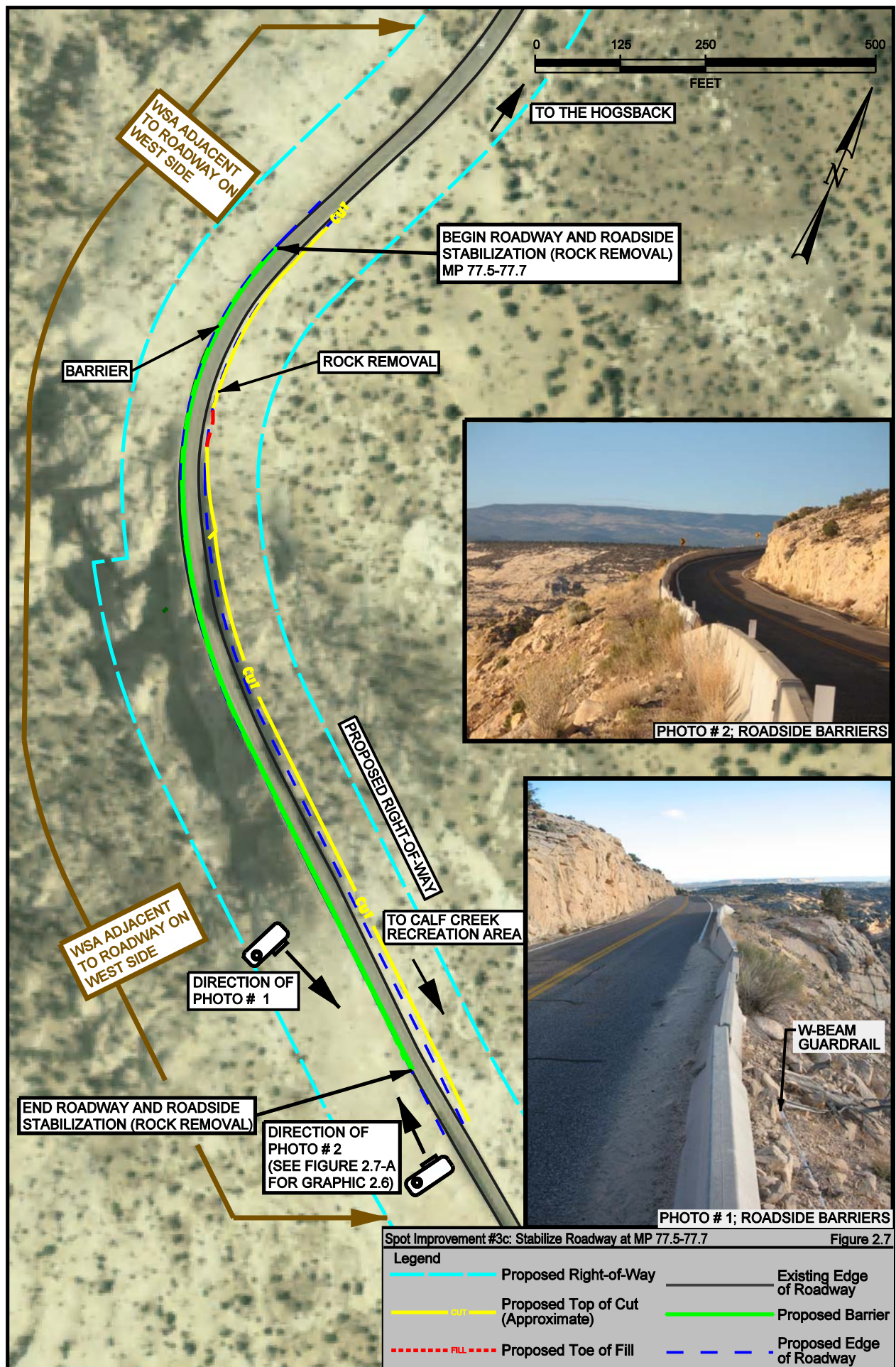
View of Curve From North Looking South

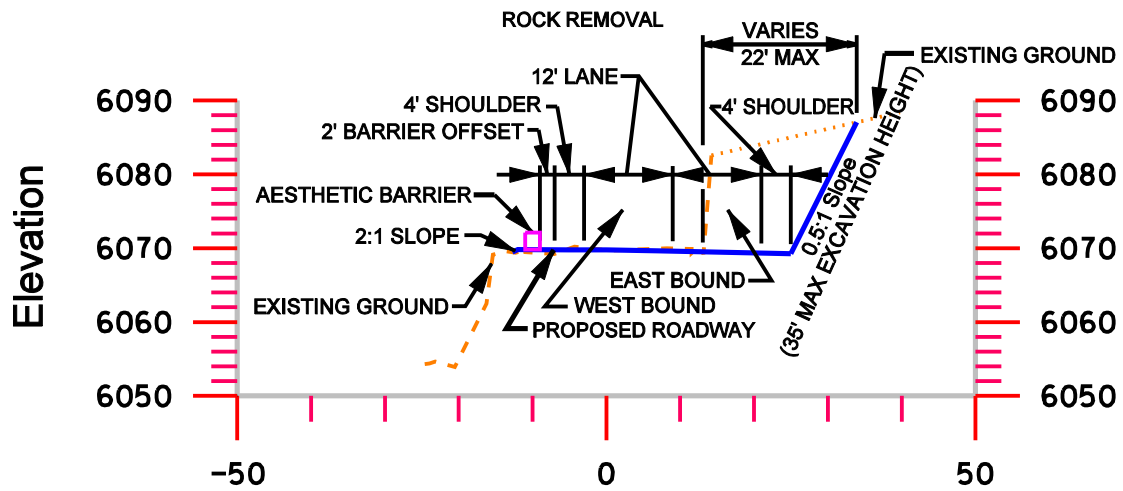




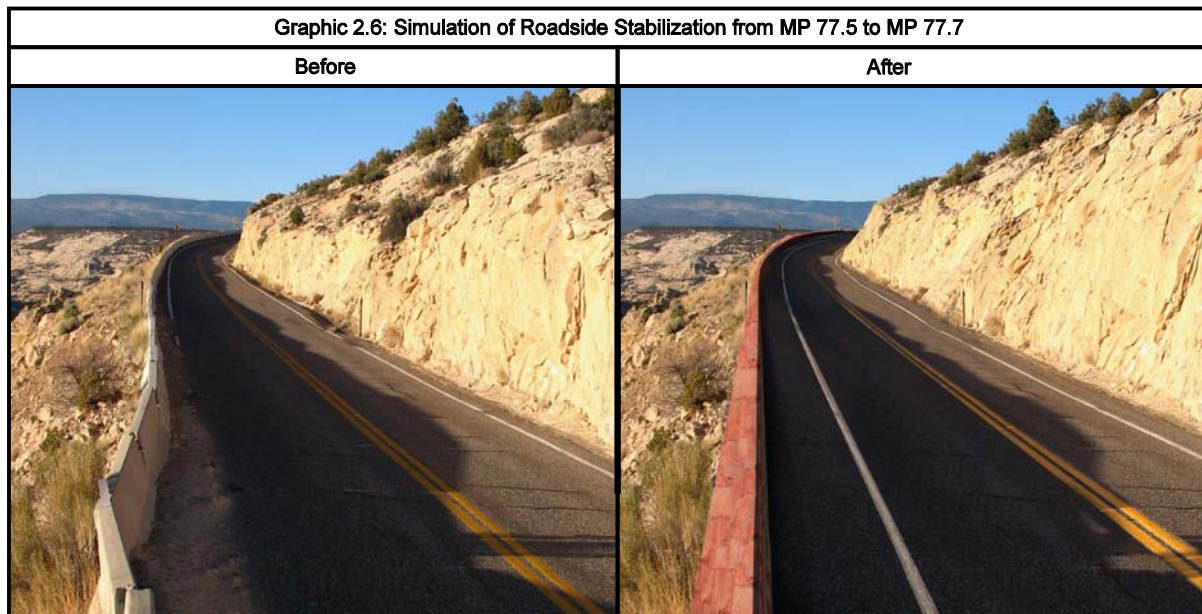
Graphic 2.5: Simulation of Roadside Stabilization at MP 75.4 Option 2-Retaining Wall



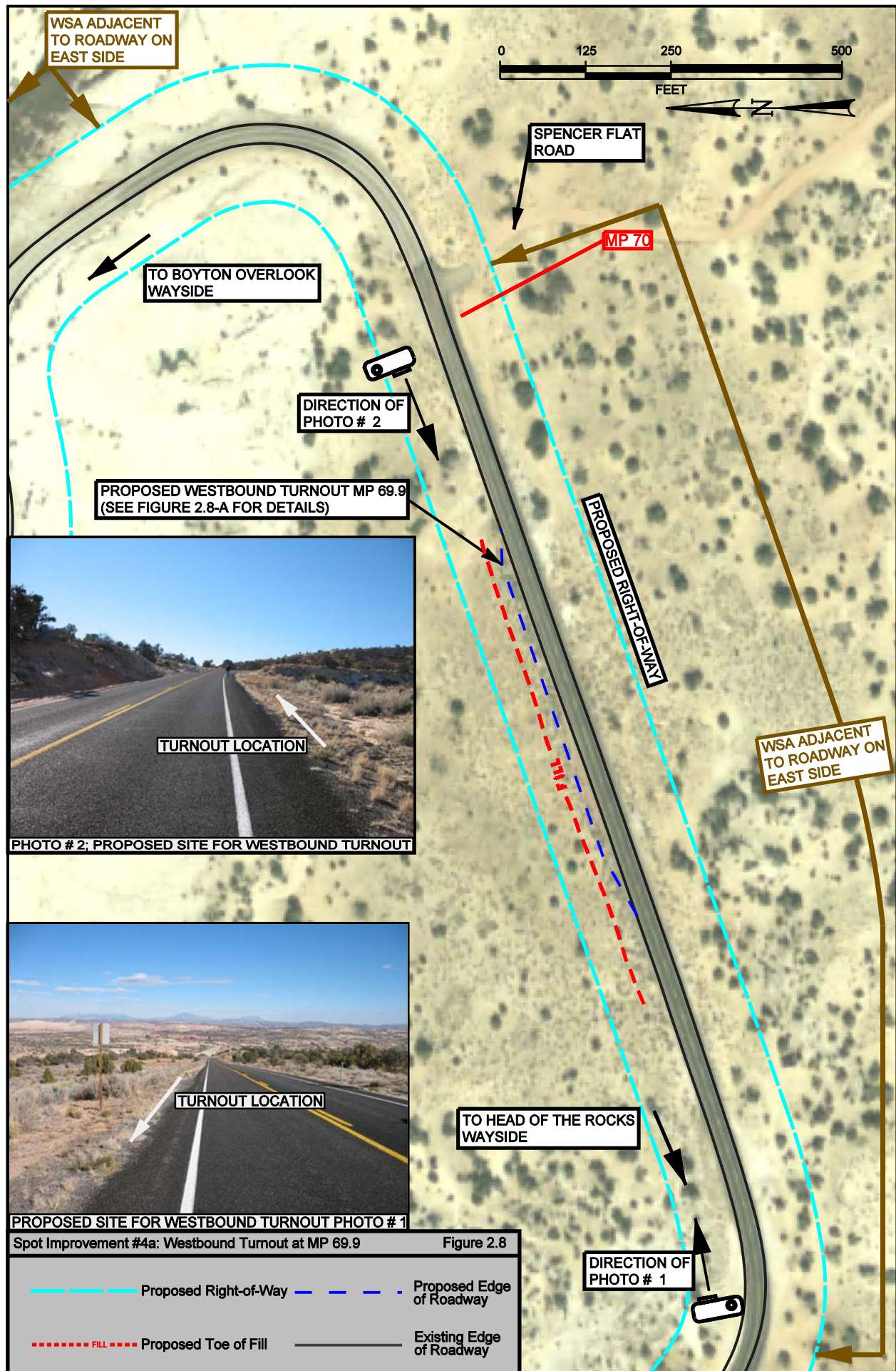


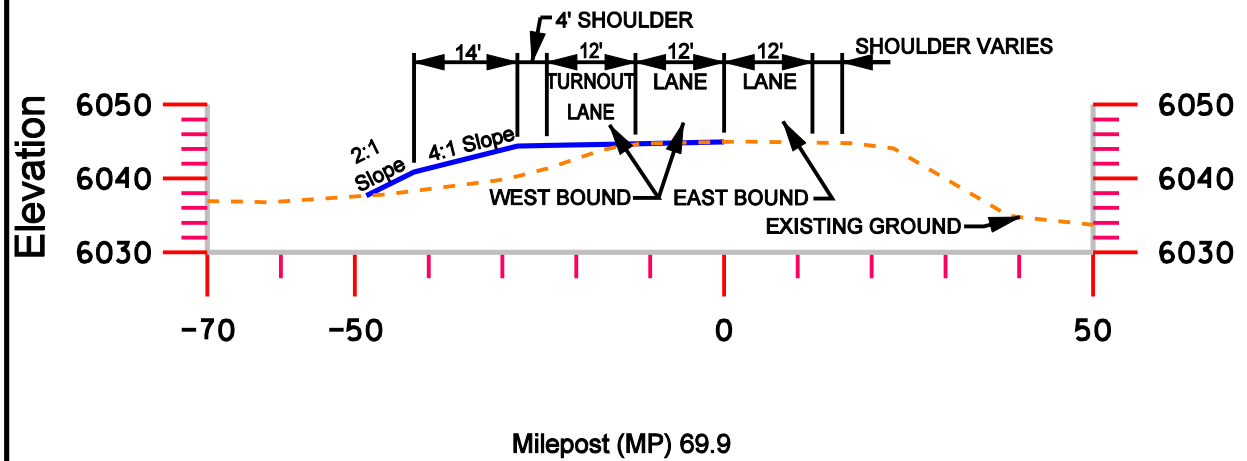


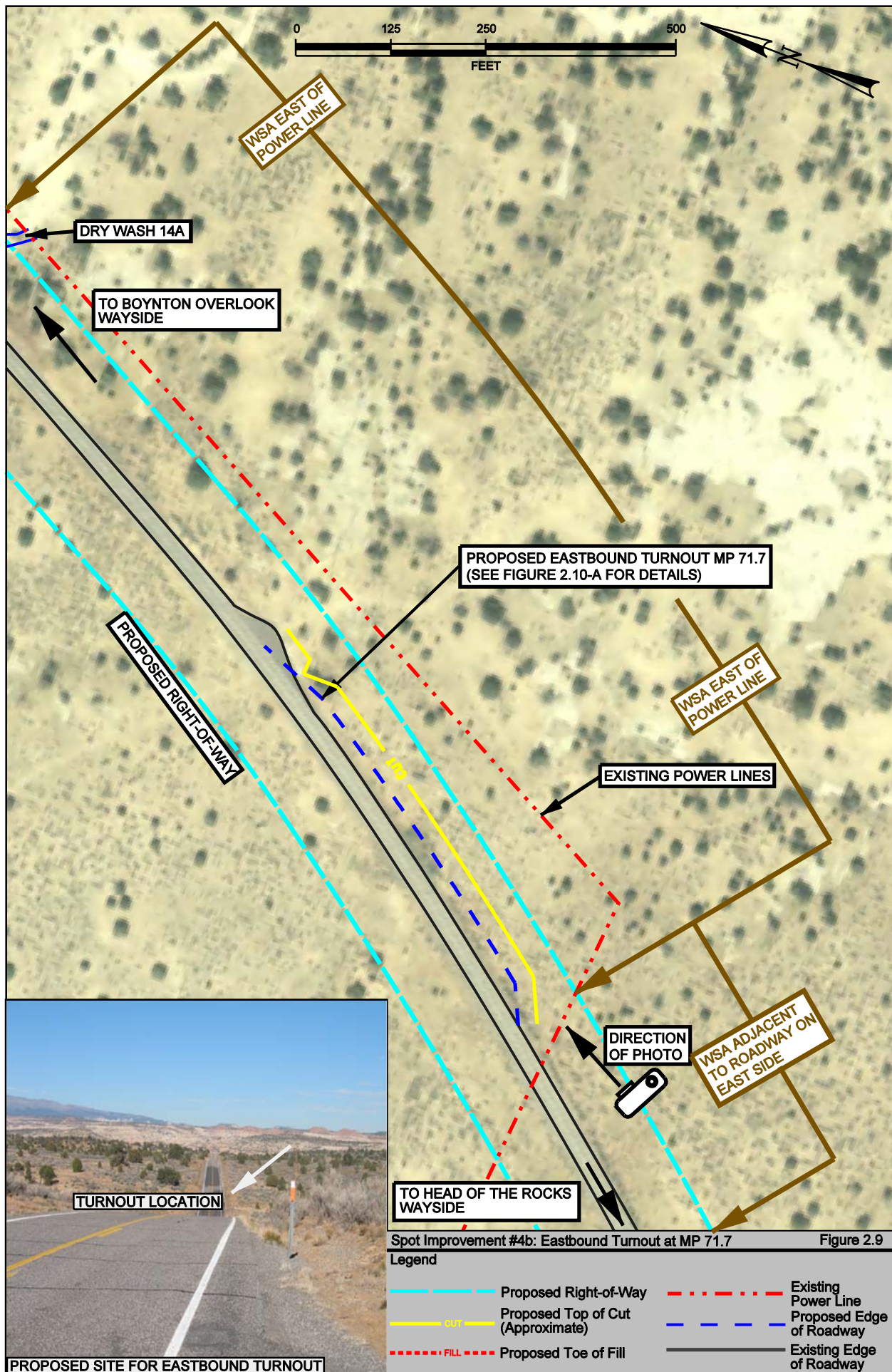
Cross Section of Roadway Rock Removal Milepost (MP) 77.5

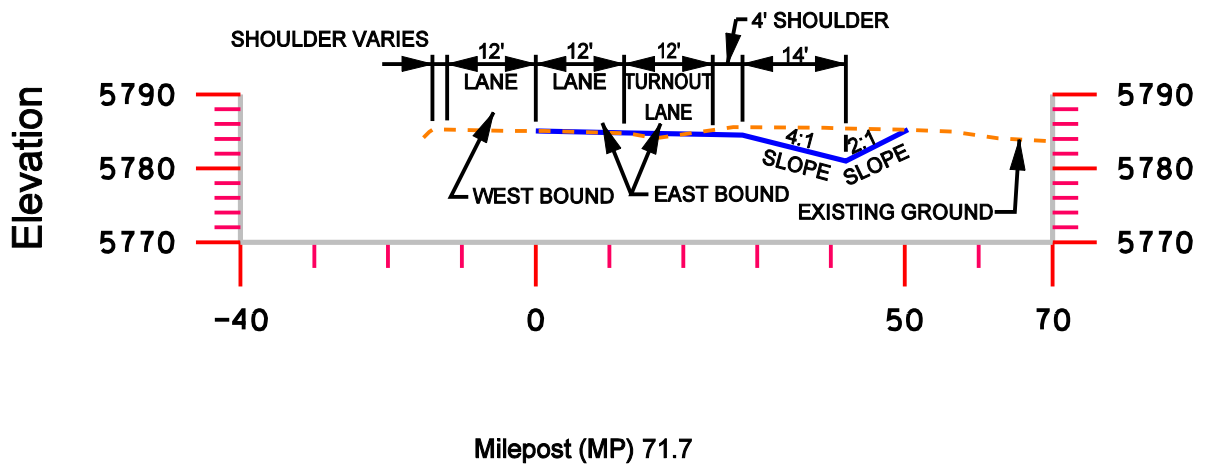


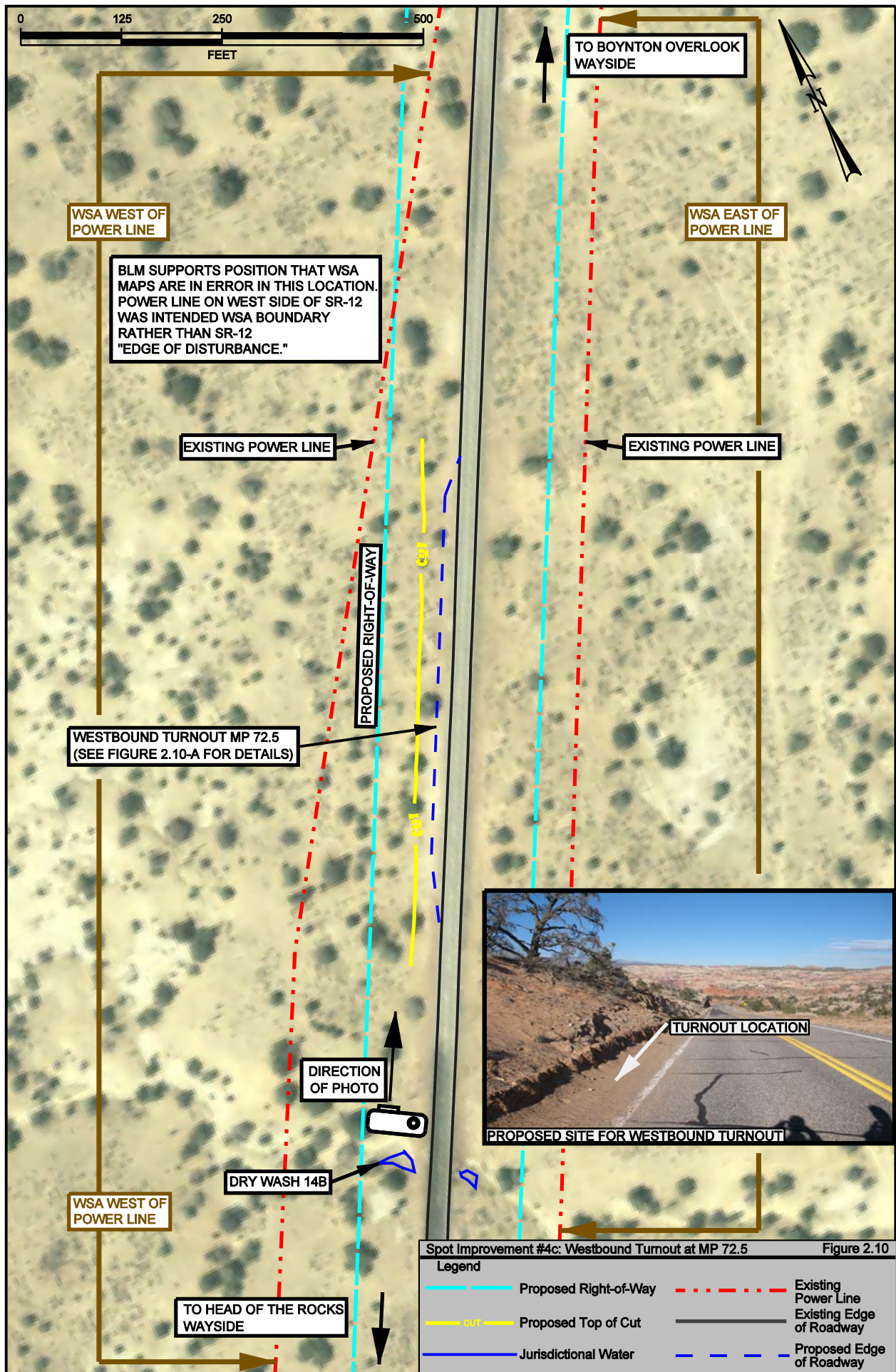
View at MP 77.5 Looking North

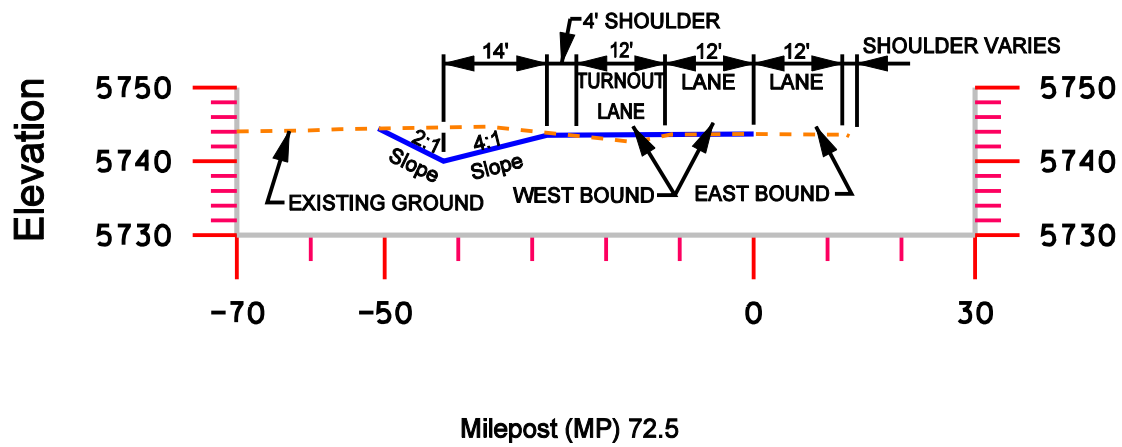


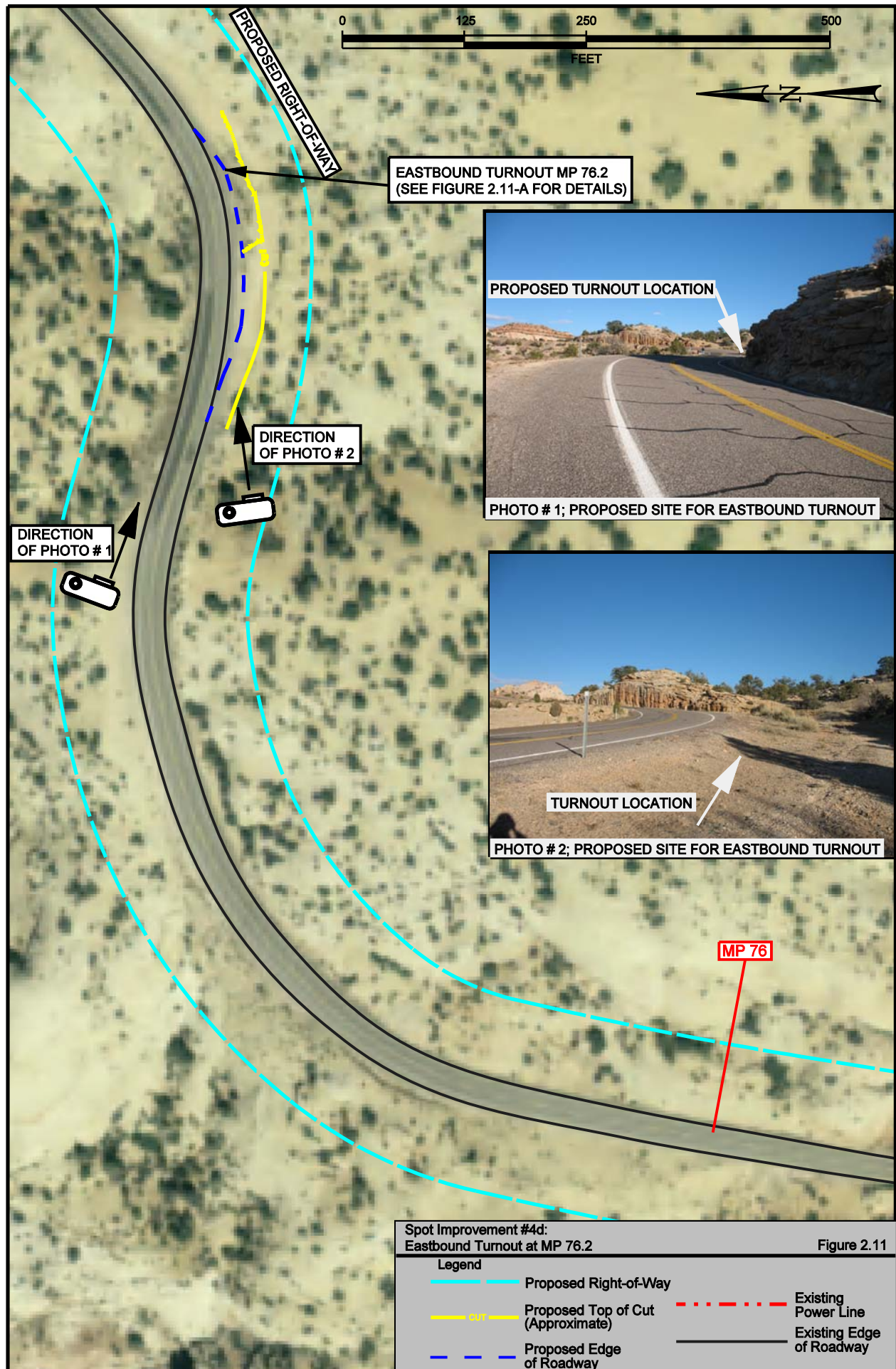


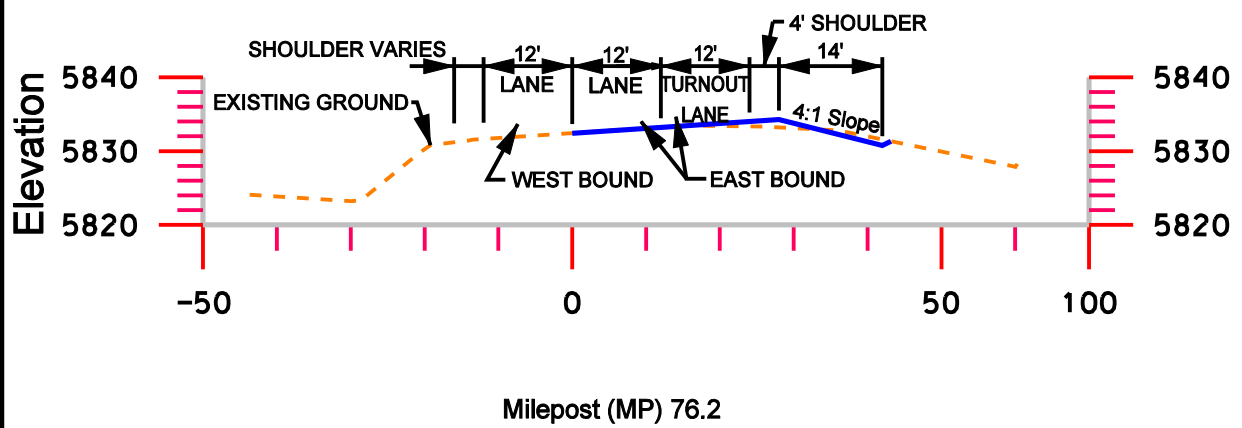


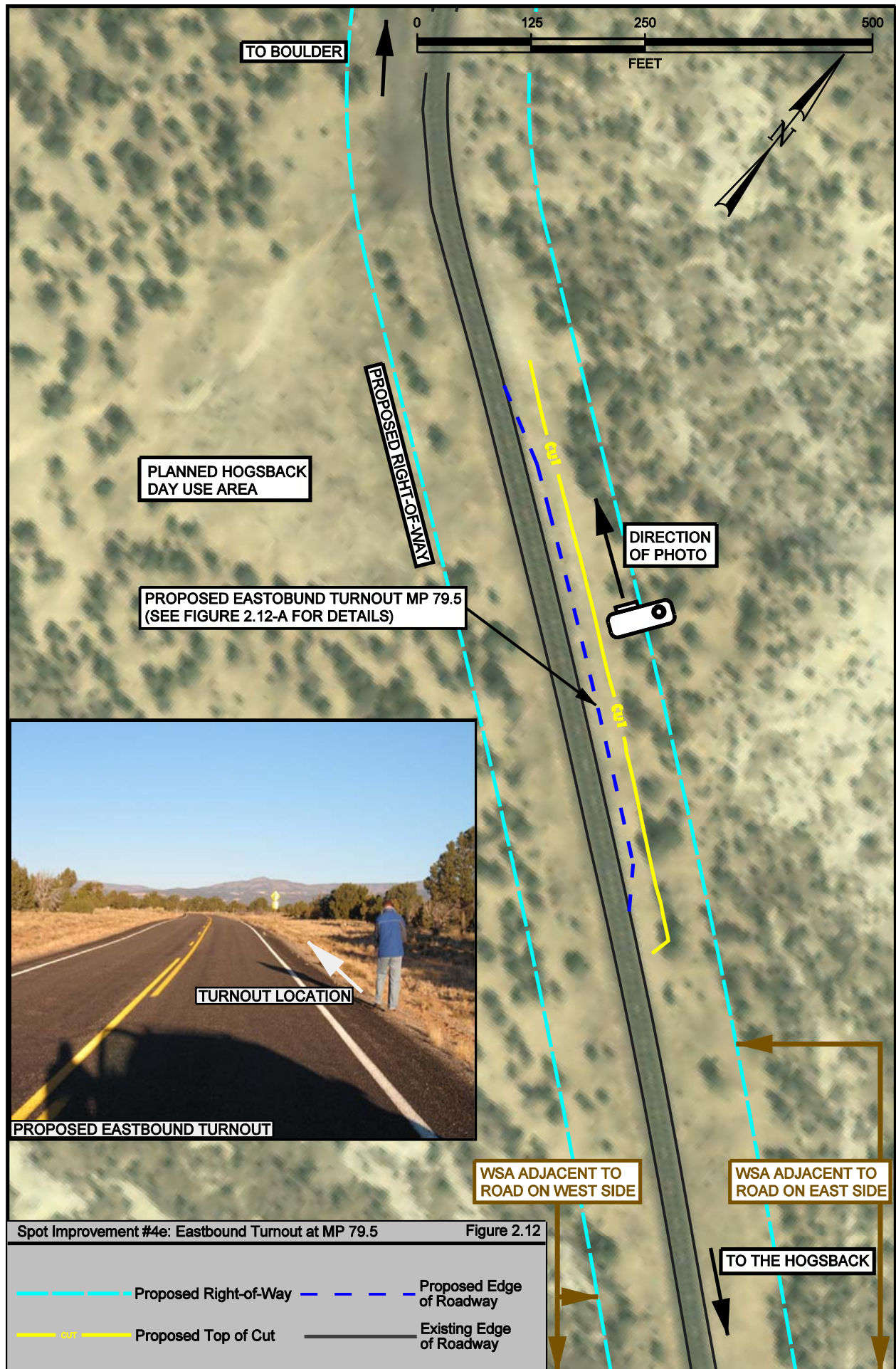


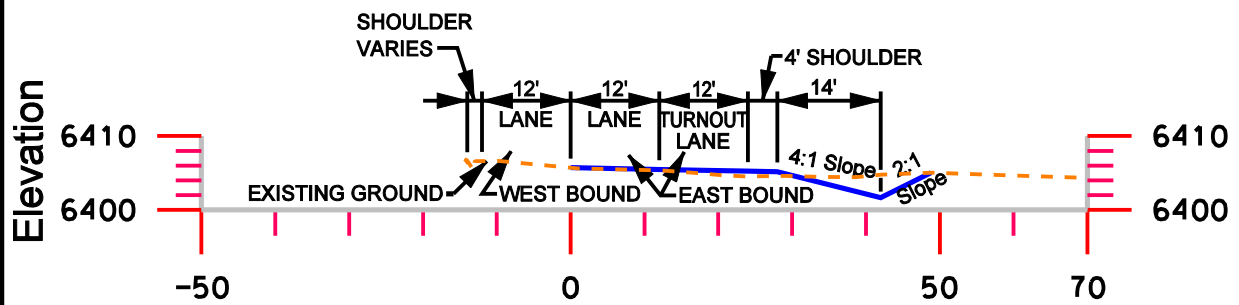




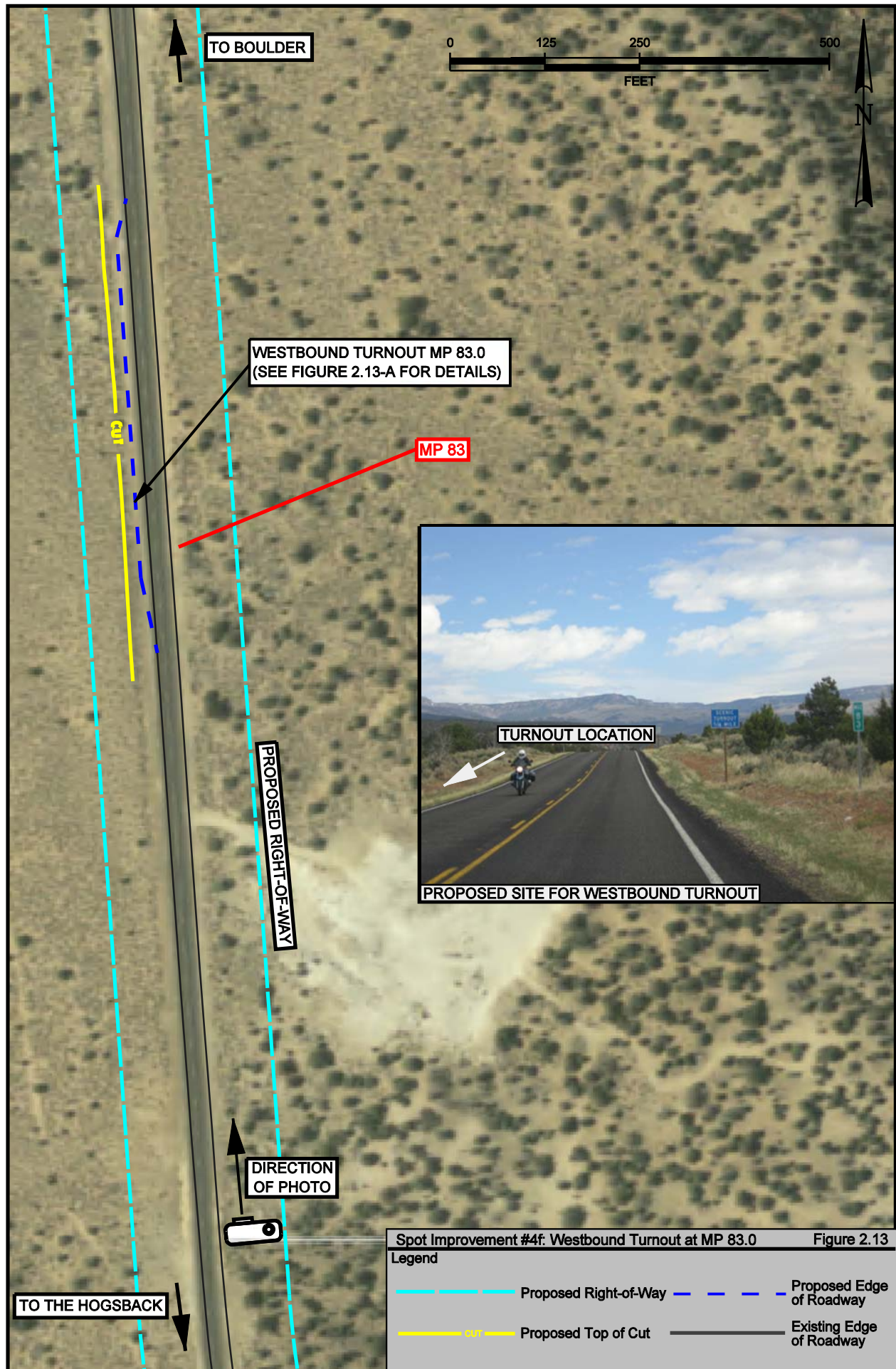


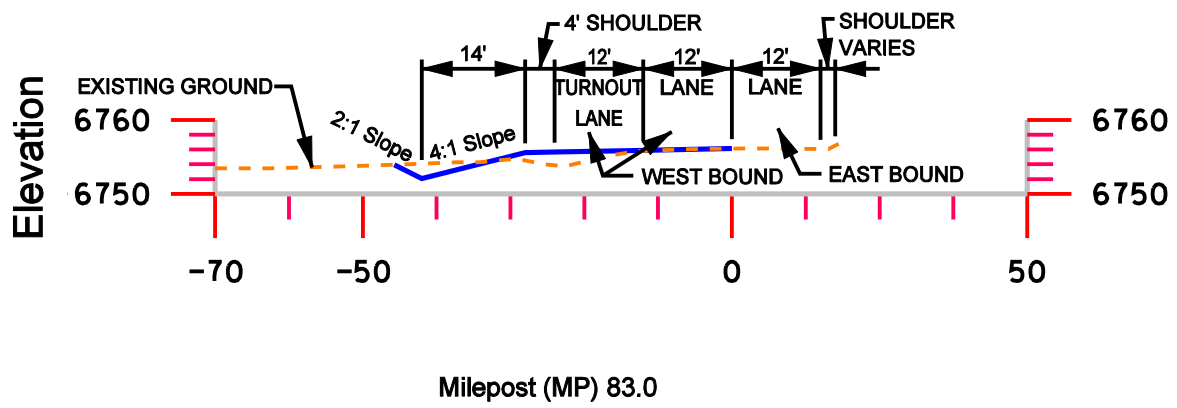


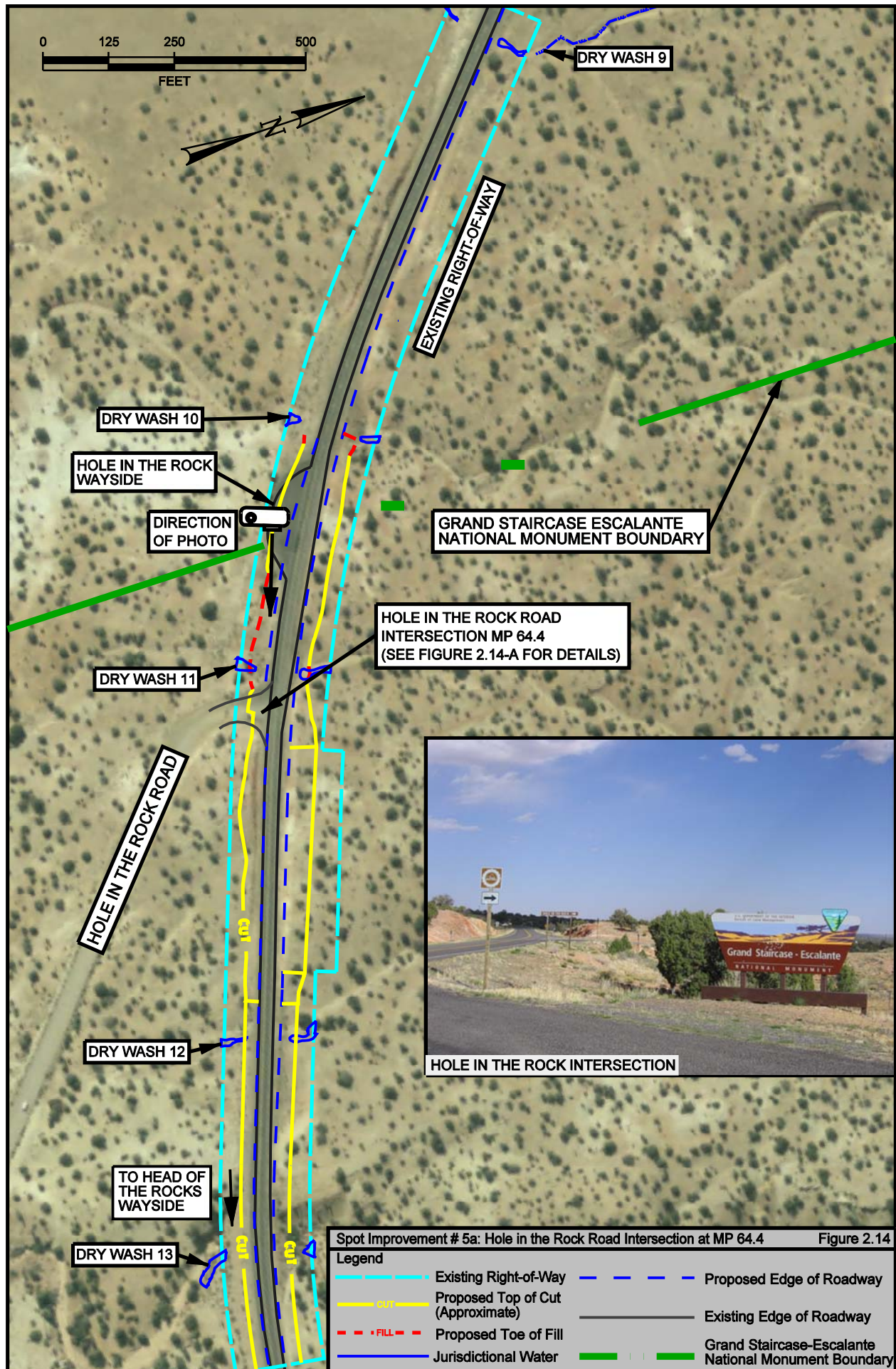


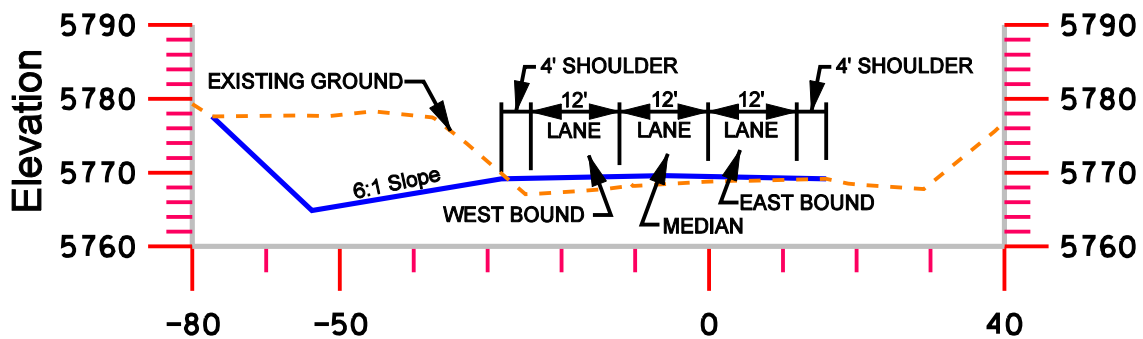
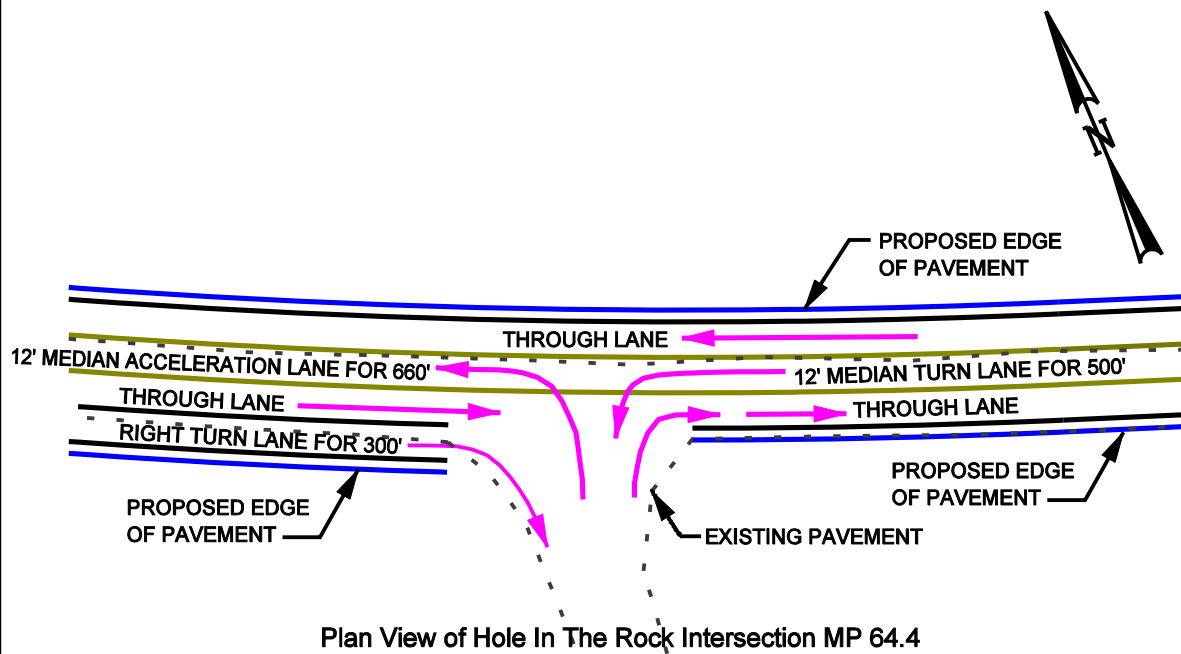


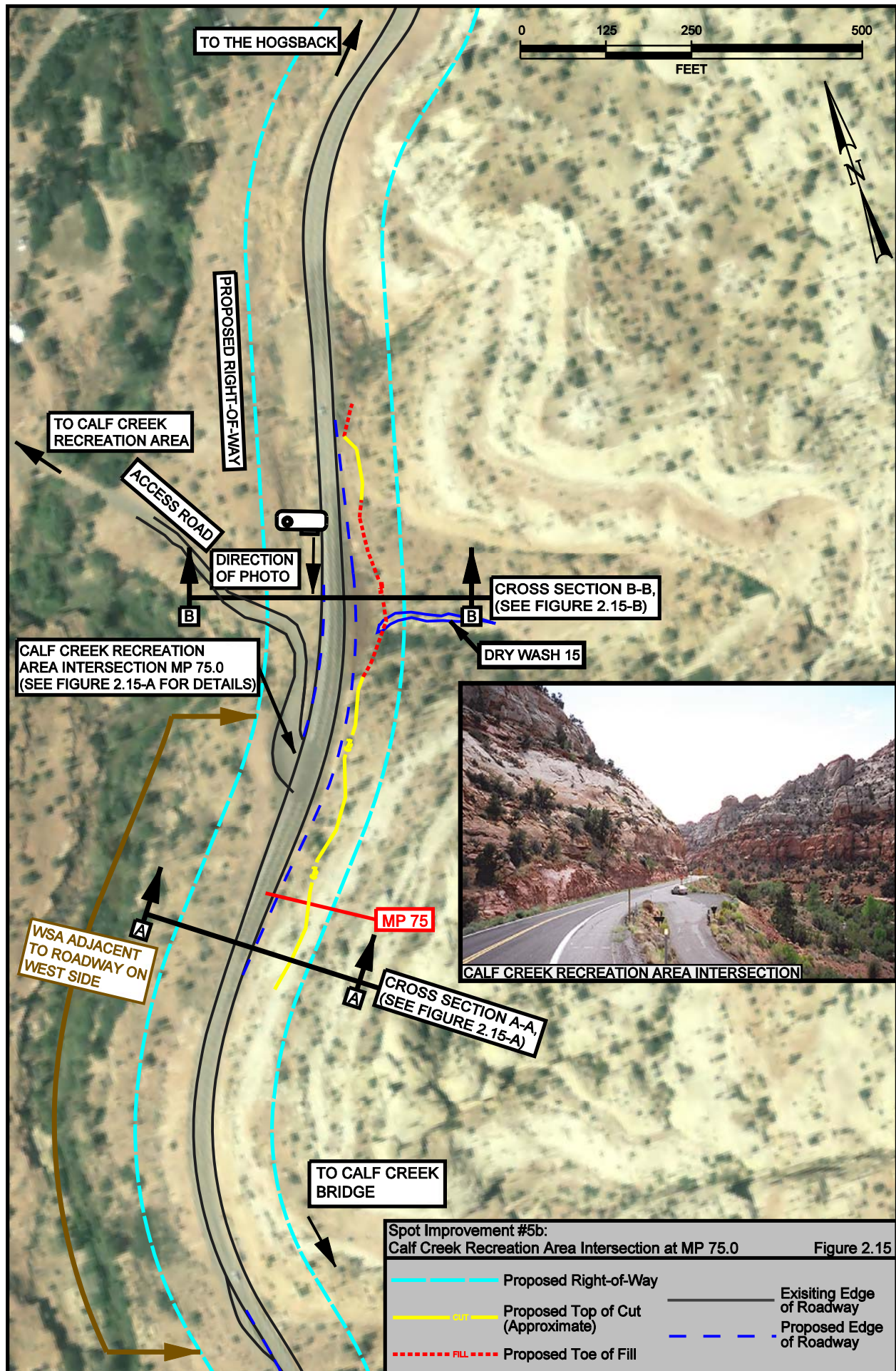
Cross Section of East Bound Turnout Milepost (MP) 79.5

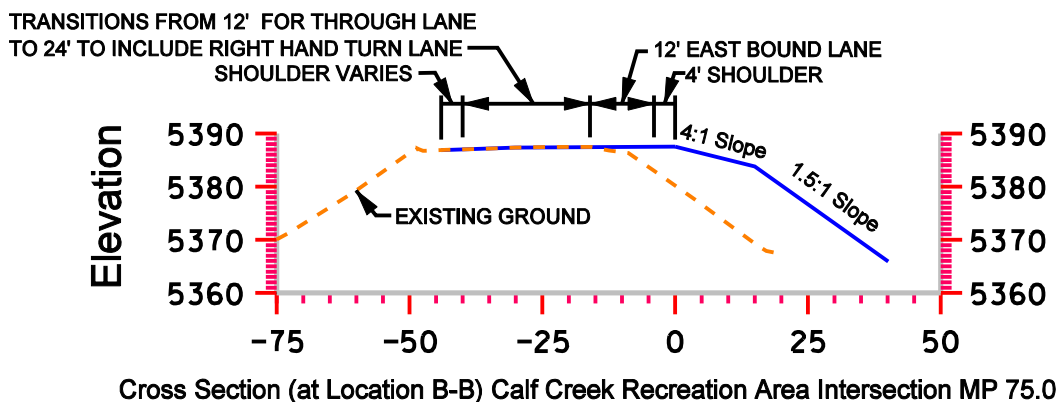
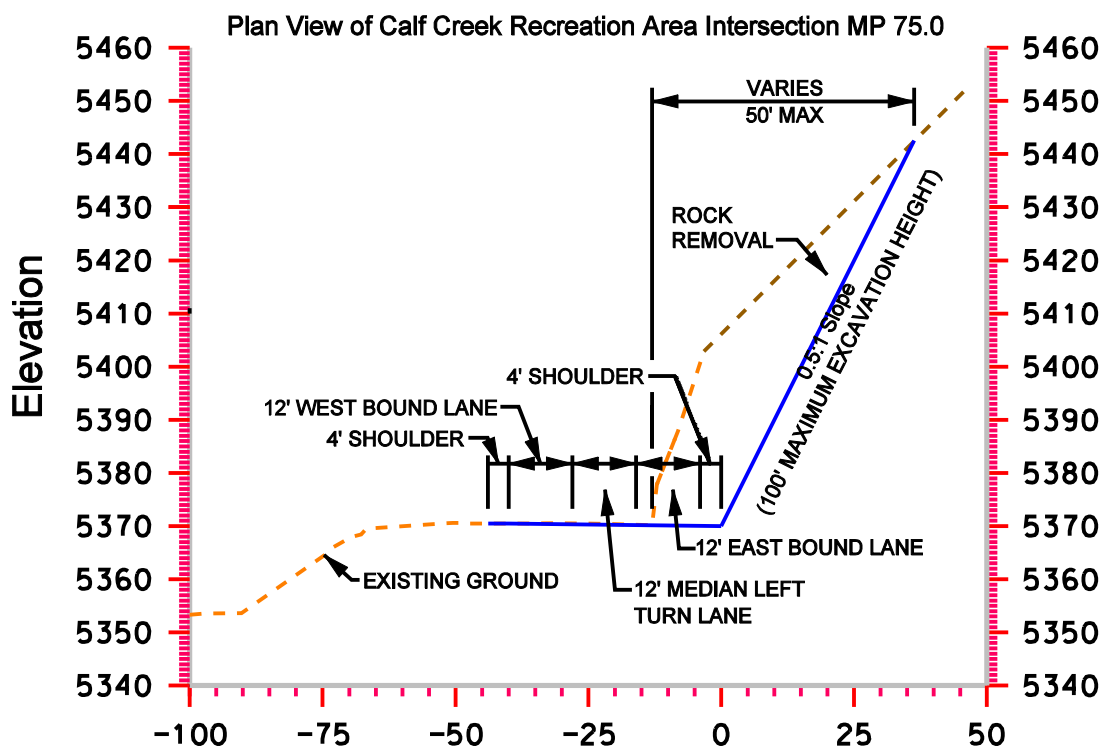
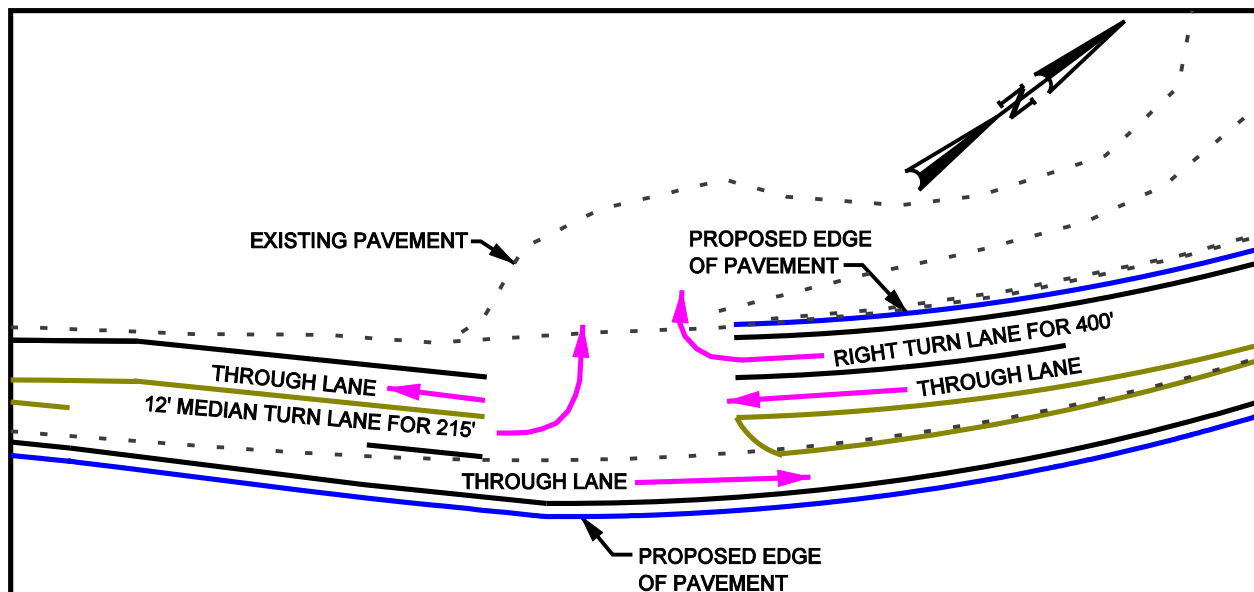


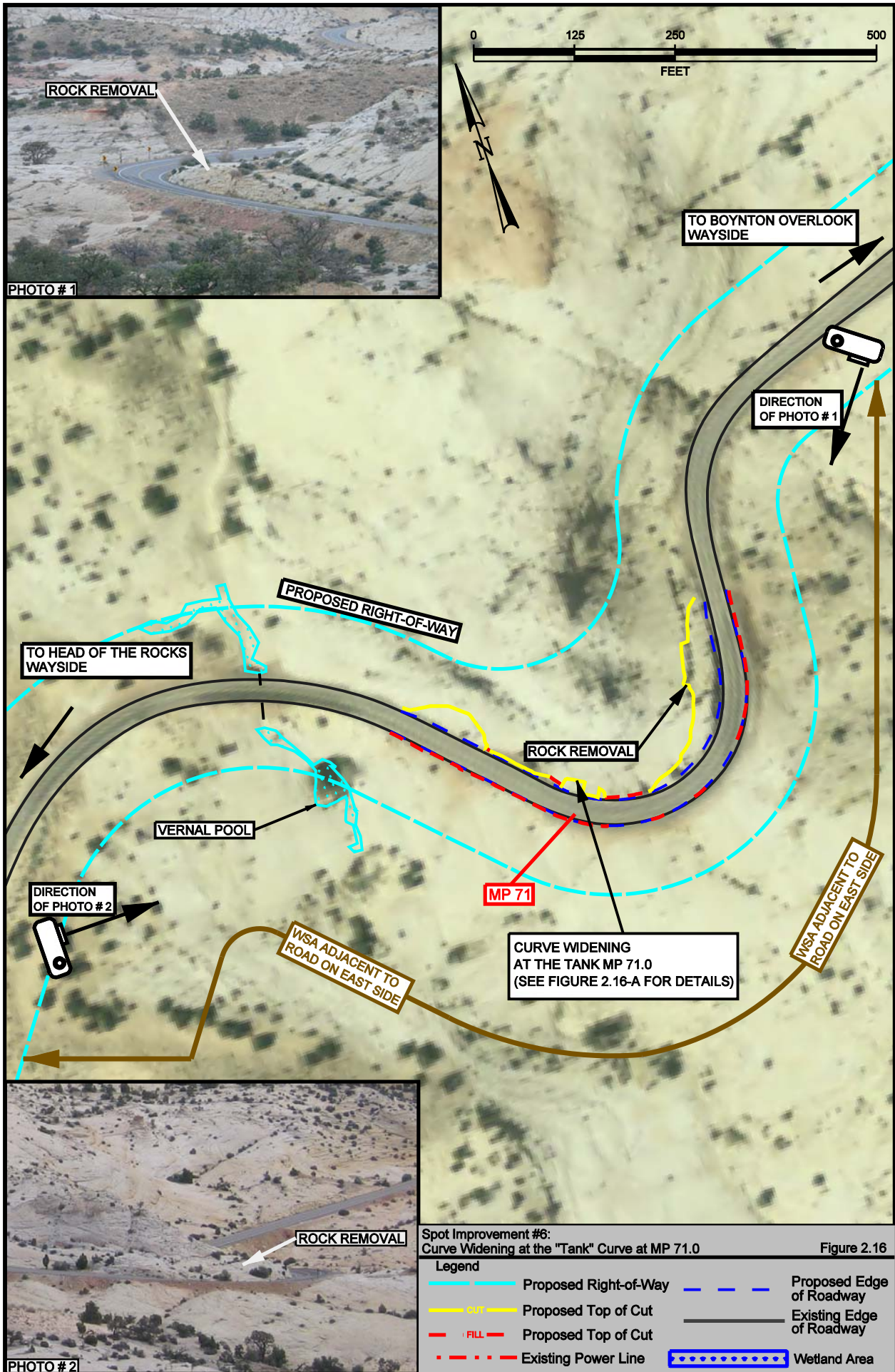


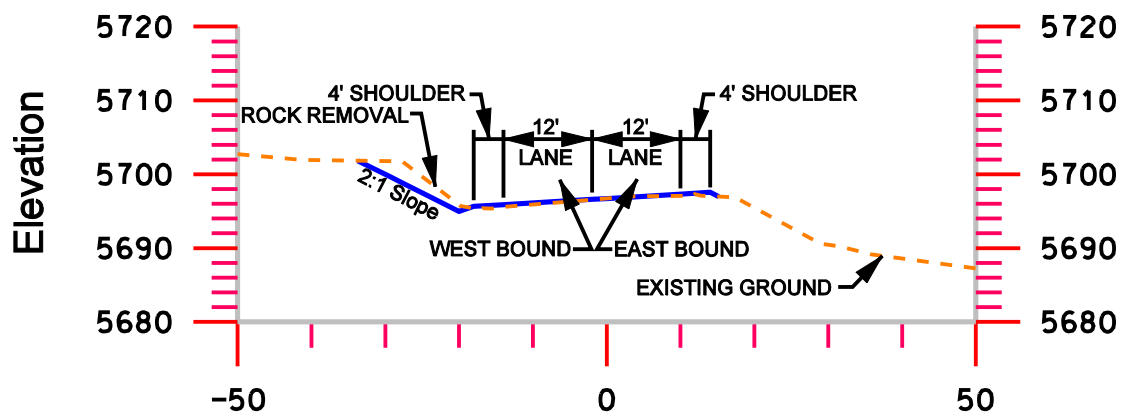












Pavement Widening At "The Tank" Curve M.P. 71.0